

# Chemical Week



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...here's  
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...effective  
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## What's in prospect for petroleum?

While not as much in evidence here as the gasoline, there are many other important products of petroleum in this picture.

Today, few processes are as prolific as petroleum refining. In addition to new high-octane fuels and improved lubricants, many new plastics, paints, dye-stuffs, detergents, and drugs owe their origin to a refinery. And, as the list grows longer, so grow the requirements of one of the nation's largest chemical-consuming industries.

To anticipate and provide for the diverse chemical requirements of the petroleum industry, Olin Mathieson offers a unique program of *coordinated planning and production*. This assures refiners and processors of the

availability of chemical raw materials regardless of changing market conditions, new product developments, or requirements for plant expansions.

At present, a growing number of chemical consumers are coordinating their planning and production with Olin Mathieson . . . America's prime producer of basic industrial chemicals. Olin Mathieson's long experience and familiarity with the broad market picture will prove invaluable in *your* planning. Why not consult with us . . . now?

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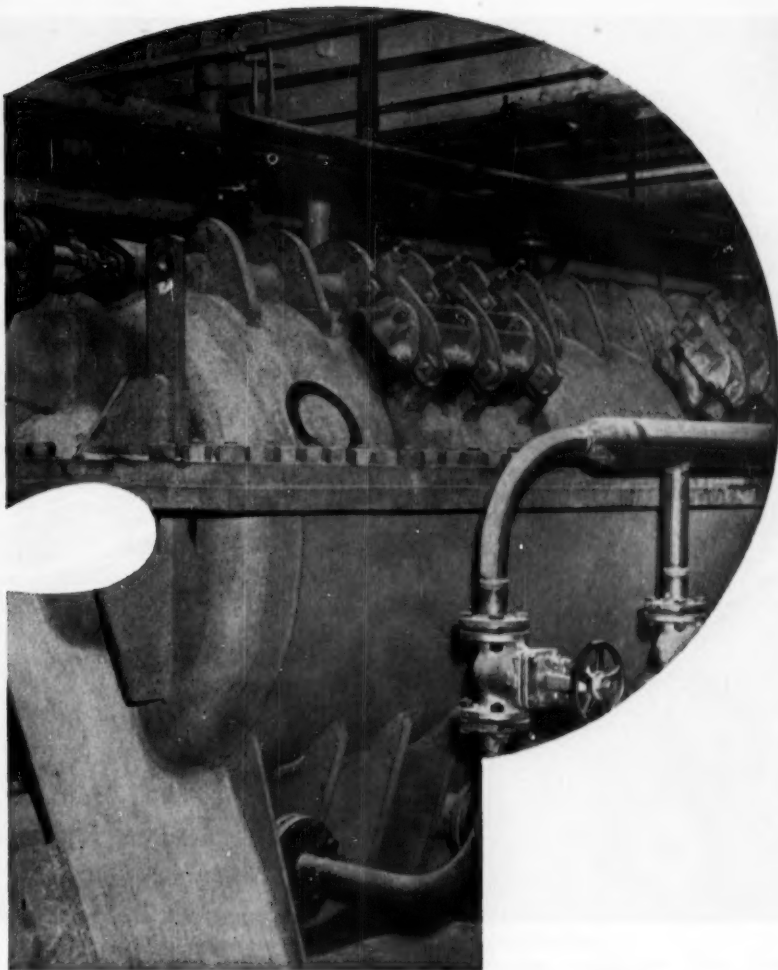


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The filter, in this particular process, was designed and engineered to filter salt from a dope-like material under very high pressure and temperature . . . complicated by the presence of a highly caustic solution. It has a filtering surface of 738 square feet, and will meet A.S.M.E. code requirements for pressures up to 150#. The filter uses a precoat . . . the cloth can be readily replaced by the customer. G-B filters of this type are available in all welded nickel and stainless steel construction . . . with solid or clad shell and solid filter element.



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PHOTO BY PAISLEY, SARNIA

## SARNIA... international crossroads for industry

One of the fastest-growing of Canada's industrial centers is Sarnia, Ontario. Sarnia lies at a natural crossroads, where the rail system of the Chesapeake and Ohio enters Canada across the St. Clair River, a part of the world's busiest waterway system. Thus Sarnia enjoys exceptionally good transportation, both by rail and water, to all parts of North America.

Other attractions are an unlimited supply of good water for industrial use and nearby sources of salt, natural gas and other raw materials.

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Completion of the St. Lawrence Seaway will bring deep draft ocean shipping directly to this waterfront and extensive development of this whole area will be accelerated.

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 CANADIAN OIL REFINERIES, LTD.  
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 BELTON LUMBER COMPANY, LTD.  
 SIFTO SALT LIMITED  
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 SUN OIL COMPANY, LTD.  
 CHEMICAL VALLEY  
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# Xtracts

USEFUL INFORMATION ABOUT  
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DU PONT  
ELECTROCHEMICALS DEPARTMENT

## Tetrahydrofuran—intermediate and powerful solvent

Best known for its high solvent power, tetrahydrofuran also has large scale uses as a chemical intermediate. A wide variety of reactions indicate its versatility, for example:

Oxidation ..... succinic acid  
Chlorination 2,3-dichlorotetrahydrofuran  
Hydrochlorination ..... 4-chlorobutanol  
Acylation ..... esters of 1,4-butanediol

In addition, THF is used in extraction and as a solvent medium, particularly for Grignard, sodium acetylide and other reduction reactions. Its ether structure, stability, low boiling point and solvent capacity point to a promising future for THF in both fields.

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Check the coupon for more data about this powerful solvent.

### Formaldehyde—The Chemical Button

Formaldehyde is one of the most reactive organic chemicals. It reacts with a wide variety of organic and inorganic compounds to make many



interesting and useful derivatives. It takes part in many reduction, addition, condensation, and polymerization reactions. Its methylene ( $-\text{CH}_2-$ ) group functions as a "chemical button" to link similar or dissimilar molecules.

High purity 50% and 37% formaldehyde is available at low cost from Du Pont. For more information about its properties, just check the coupon.

## Unusual Solubility Gives "ELVALAN" Wide Range of Uses

"Elvalan" vinyl polymer (formerly "Elvadex") is a unique vinyl acetate copolymer, readily soluble in aqueous alkaline solutions, but insoluble in acidic or neutral solutions. It is also soluble in many organic solvents. These unusual properties make it adaptable to a number of industrial applications including paints, paper coatings, adhesives, and as a textile size and finish. Used as the ammonium salt, "Elvalan" films will be water in-

soluble. The sodium salt yields a film which is easily dissolved in water.

Clear, glossy films can be produced from solutions of "Elvalan" in either aqueous alkali or organic solvents. A wide variety of softeners, plasticizers, extenders, etc., may be used to modify the properties of these solutions and films.

Aqueous alkaline solutions are easily applied to porous materials such as paper and wood. Temporary protective coatings are readily removed by washing with dilute alkaline solutions. Paper coatings made from "Elvalan" solutions are both greaseproof and glossy. Coating mixes can be easily pigmented.

The properties of "Elvalan" solutions suggest its use as a pigment dispersing agent for latex paints, leather finishing compounds, and binder in printing inks.

Check coupon for more information about this versatile polymer.

## Liquid Sodium for Heat Transfer

Some of the properties which make sodium suitable for heat transfer are: low melting point, high boiling point, low density, low viscosity (in liquid form), and a very high thermal conductivity.

Sodium also has the property of wetting iron and steel, which improves the film coefficient against these materials. Its low density at both its melting and boiling points makes sodium a low-cost metal per unit volume. Sodium potassium alloys are available with melting points from room temperature to 208°F.

For more information on this timely subject, check the coupon below.

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Please send me literature and information on: (CW-11)

- ☐ Tetrahydrofuran
- ☐ "Elvalan" vinyl polymer
- ☐ Epoxidation with  $\text{H}_2\text{O}_2$
- ☐ Sodium
- ☐ Formaldehyde



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... THROUGH CHEMISTRY

## Epoxidation with $H_2O_2$

Hydrogen peroxide used in conjunction with a cation exchange resin provides a new method for the epoxidation of vegetable oils, animal fats, and their derivatives. This method has been applied with outstanding success. There is considerable interest in epoxidation as a means of upgrading the natural fats and oils. This technique offers an improved method for converting these raw materials into more useful products.

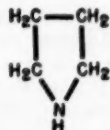
Hydrogen peroxide, which is a mild oxidizing agent, often must be transformed into an organic peracid or activated by some other means to make full use of its oxidizing power. Under appropriate conditions, the cation exchange resin functions to make hydrogen peroxide more reactive.

The method operates best under conditions for the *in situ* formation of an organic peracid, contributing to a highly efficient and economical reaction. By the *in situ* formation of peracid is meant a one-step reaction in which peracid is formed and used in the presence of the material to be epoxidized.

For more information on epoxidation with  $H_2O_2$ , fill out and mail coupon.

## For Efficient Epoxy Hardeners

Evaluate Du Pont Pyrrolidine, a new reactive chemical intermediate. One of the applications for which it has been suggested is its use as a curing agent for epoxy resins. Reports show that Pyrrolidine is particularly effective with epoxies formulated as adhesives. Bonding tests have been made on steel, brass and aluminum. As little as 5 percent of this hardener based on the weight of the resin gives bond strengths much higher than those obtained with other catalysts.



Pyrrolidine is a colorless, mobile liquid. It has a very penetrating, amine-like odor and a boiling point of 86-87°C.

If you have a potential application for Pyrrolidine as an epoxy hardener and would like an evaluation sample, write to us on your company letterhead.

# OPINION

## Versatile Liquid

TO THE EDITOR: The *CW* Report "Synthetic Detergents: The Boom Won't Wash Out" (Oct. 22, p. 41), by Dr. Price, is excellent and quite complete. However, it states that the liquid detergents on the market at present are "light-duty products designed for hand dishwashing" and that detergent manufacturers are working on an all-purpose liquid detergent.

We believe that we have developed the first such all-purpose liquid detergent in the country. Our S-100, as it is named, may be used for everything from washing clothes to steam-cleaning the exterior of buildings. . .

Despite its ability to handle heavy-duty work, it is easy on the hands. . .

MELVIN F. FINE

President

Fine Laboratories, Inc.

Freeport, Ill.

## Be Prepared

TO THE EDITOR: Although I have counted to 10 several times, I still feel the necessity of speaking out against the letter by Mr. John Crippen (Oct. 22) [which discussed Soviet propaganda and its influence on U.S. thinking] . . .

I should like to point out that our policies concerning government expenditures for defense are made, not by private citizens who do not have factual evidence concerning the Soviet armament effort, but by people in government authority who have access to more factual information and some *prima facie* evidence of the Soviet efforts. Consequently, we should interpret our expenditures, not on the basis of what we feel is "seeming" or "apparent," but on the basis largely of what those in intelligence agencies are reasonably sure is fact.

Second, even were the Soviet effort a propaganda effort rather than a true armaments effort, we would still not like to be placed in the position of calling somebody's bluff, particularly if he were not bluffing.

Third, with regard to Mr. Crippen's comment ("It is another matter to even begin to match the productivity of a free enterprise system."), it is not necessary for the Russians to match our productivity, because under their

standard of living, the major portion of their effort can be directed toward an armaments program rather than to the maintenance or improvement of a civilian standard of living.

Furthermore, the Russian effort, when it is an intensive one, must give us pause in our evaluation of the results that can be obtained by decree. Witness, if you will, the Russian weight-lifters, the Russian athletes in the latest Olympics, their soccer players and their chess players.

They can also channel many more people into the technology required for a modern armaments program than we are doing, and it is known that they are doing so. Witness, if you will, the ratio of their engineering graduates to ours.

Finally, on what evidence does Mr. Crippen imply that two N.V.D. agents were among the farmers visiting our country? This is the kind of hearsay that he speaks of in terms of "our buying." Is he selling?

Any policy that is predicated on the belief that the Russian claims are a propaganda effort rather than a physical reality could find us in the embarrassing position of being unprepared to meet the proof of these realities. Certainly, our defense expenditure is cheap insurance against the possibility of being obliterated from the face of the earth. . .

E. R. SWEET

Singmaster & Breyer

New York

## SEE YOU THERE

Manufacturing Chemists' Assn., semi-annual meeting, Statler Hotel, New York, Nov. 22.

American Institute of Chemical Engineers, annual meeting, Statler Hotel, Detroit, Nov. 27-30.

Weed Society of America, first annual meeting, New Yorker Hotel, New York, Jan. 4-6.

*CW* welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: W. A. Jordan, Chemical Week, 330 W. 42nd St., New York 36, N.Y.



The laboratory methylating equipment shown above is being explained by Dr. T. R. Patterson, head of our Methylation Department.

## Your methylating problems could end here!

If you have a problem relating to the methylation of an organic compound, why not call in an Ansul specialist? It actually isn't necessary to start at the "beginning." Methylation has been a specialty of ours since 1936. The experience we have gained by methylating more than 100 compounds during the last 18 years is at your disposal to help solve your particular problem.

Our methylation laboratory is equipped to take over your methylating problem at *any stage of development* and come up with a practical answer. We have manufacturing facilities for producing commercial quantities of a methylated compound to your specification.

Ansul is a major producer of methyl chloride and prepared to supply you with quantities ranging

from laboratory cylinders to tank car lots. Our methyl chloride is available in cylinders of 100 lbs., 140 lbs., and 1300 lbs., and tank cars of 40,000 lbs. and 78,000 lbs. Delivery is prompt.

Address your correspondence to the head of our methylation laboratory, Dr. T. R. Patterson, **ANSUL CHEMICAL COMPANY**, Dept. C-15 Industrial Chemicals Products, Marinette, Wisconsin.

*We will be at the "Chemical Show," Booth 521, Dec. 5-9 in Philadelphia—Stop and see us.*



# ANSUL

# Business

## Newsletter

CHEMICAL WEEK  
NOVEMBER 19, 1955

Complaints over possible tariff reductions were welling forth last week from chemical executives. Objecting most violently to any further cuts: synthetic textile makers and metals producers.

Textile company executives, who say they're among the leading 1955 victims of rising foreign competition, want import quotas to hold down shipments of foreign (and especially Japanese) goods to the U.S. And a spokesman for the U.S. tungsten industry is darkly predicting that U.S. tungsten producers "face a shutdown within eight months" because of foreign competition.

Actually, the complaints—most of them registered at the Tariff Commission's hearings on peril points—are little more than opinion samplings at this time. But two conferences held at opposite corners of the U.S. may ring a more resolute protest when Congress reconvenes next January.

The first, at Sacramento, Calif., last week, included representation from 11 Western states, and called for drastically increased tariffs on imported metals—or, failing that, smaller increases with the money received therefrom to be used for subsidies to domestic producers.

The second, held in New York (and including representatives from Colgate-Palmolive, Union Carbide International, Du Pont of Canada, Monsanto and Firestone), whiplashed two "business blasters"—foreign duties and U.S. tariff reductions.

The handwriting is on the wall in another quarter this week: uninhibited dumping of industrial waste and untreated sewage into major streams is doomed.

Warnings have gone out to five chemical process companies, 15 other industrial firms, and 17 cities and villages in New York to stop such practices immediately—or face injunction proceedings in court. Named in the State Water Pollution Control Board's program to clean up the Hudson River for drinking, swimming and fishing: American Seal Paint Mfg. Co., General Aniline & Film Corp., Hudson Glue Corp., North American Cement Corp., and Winthrop-Stearns, Inc.

Plans have been approved to construct a \$16.5-million, 28-mile water channel from Port Lavaca, Tex., to the Gulf of Mexico. Initial cost would be divided between the federal government (which would put up \$9.5 million) and local interests (which would stake \$7.0 million) in the project.

One of many chemical firms due to profit as a result: Aluminum Co. of America, which is building a \$35-million alumina plant at Port Lavaca. When completed, the channel will permit Alcoa ore carriers to transport South American or Caribbean bauxite directly to the company's plant site.

Investigating the possibility of building a polyvinyl chloride plant in the San Francisco Bay area last week were representatives of Imperial Chemical Industries.

Stauffer looked into a similar idea at one time; the thought has had more than passing interest to other U.S. firms.

What's intriguing U.S. observers is this: British-owned ICI is once again openly ogling the American market—with its promise of high profits.

A long-standing effort (by Peter Colefax) to bring Western Electrochemical Co. into the American Potash family (CW, Dec. 4, '54, p.38) has finally been realized.

## Business Newsletter

(Continued)

Ampot, at latest count, owned 88% of Wecco's stock, should gain the additional 12% as soon as individual small stockholders are contacted.

Wecco President Bob Burns will resign shortly before Dec. 1, but will stay on as an Ampot consultant for one year.

More synthetic rubber capacity appears imminent with word that Texas-U.S. Chemical Co. will increase its capacity at Port Neches, Tex., to 75 million lbs./year. Completion is scheduled for mid-1956.

The second French company to be set up within the past three months to produce titanium products was formed in Paris last week. Its owners: Pechiney, Electro-Metallurgique du Planet, Fabrique de Produits Chimiques de Thann et Mulhouse, and Bozel Maletta; its name: Titanium.

Initial capitalization has been set at 250 million francs; the company will start construction of a plant in La Praz before Christmas.

Plans are brewing in Germany, too—over possible import of U.S. coal (via now-mothballed Liberty ships) to Germany.

The plan (an adaptation of one originally proposed by the United Mine Workers in 1951) reportedly is for West German industrial interests and the UMW to set up a joint corporation, lease surplus ships from the U.S. government, and then transport U.S. coal at cost. Profit would come, not from operation of the shipping company, but through sales of coal in Europe.

Moving a giant step closer to ultimate solution is the thorny case determining ownership of government-held General Aniline & Film Corp. In a ruling handed down last week, Federal Judge David Pine (of the U.S. District Court of the District of Columbia) denied a government motion to have several intervenors' suits dismissed.

This paves the way for the case to go forward with the taking of evidence on who is entitled to recover stock—in the event that Interhandel is unsuccessful in its recovery attempt.

A tentative mill site was chosen last week, near Kingman, Ariz., for Arizona-Golconda Metals' proposed \$2.5-million hydrometallurgical mill. Theory of the operation is not new (involved roasting of sulfide ores to provide recoverable sulfuric acid and various metal oxides, from which a number of basic metals can be produced). But the Arizona-Golconda project—when in operation—should make possible the reopening of many currently closed zinc sulfide mines in the Arizona area.

Proving once again the power of the written word, full-page advertisements in Sacramento, Calif., are credited with the defeat of fluoridation.

Crying "Warning! Fluorides Can Prove Poisonous," the 3-in. headlines swung enough voters over to the side of the anti's to negate pre-poll surveys indicating acceptance of fluoridation.

# SODIUM metallic

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Available in tank cars, and cast solid in drums, Ethyl can furnish sodium specially filtered and handled under argon, out of contact with nitrogen or oxygen.

Top physical properties of the refractory metals demand the finest sodium. Numerous chemical reactions may benefit greatly from the use of this high purity sodium.

The Ethyl Research Laboratories have developed improved techniques for the analysis of sodium for oxides and other impurities. We would be happy to supply high purity sodium for your work and to give technical service on sodium analysis where desired.



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## BUSINESS &amp; INDUSTRY . . .

## Getting Down to Specifics

**A plea that coming tariff reduction negotiations be made on specific chemicals, rather than on broad "basket" categories, was made last week to the Committee on Reciprocity Information.**

Making the request: Du Pont's Sam Lenher, speaking as president of the Synthetic Organic Chemical Manufacturers' Assn., who also revealed that, to help negotiators, his organization has commissioned the Census Bureau (which tallies all U.S. imports and exports) to compile a list of all imports under broad tariff categories by their specific chemical names.

Lenher points out that within four of the categories to be negotiated, there are 522 specific organic chemicals, currently produced in commercial quantities by approximately 250 companies.

Since future developments within the chemical process industries will certainly add a host of other chemicals to this group, he is opposed to changing any of the basket classifications.

"They are," he maintains, "the only practicable means to provide protection for the new products of the future . . . we concede your authority to adjust tariff rates . . . to provide for an expansion of world trade in existing articles of commerce . . . [but] we ask that you moderate the negotiations to preserve the existing protection for the products of the future."

Lenher lists these specific chemicals—all of which have defense uses—as products on which no tariff concessions should be granted: acetic acid, acetone, carbon tetrachloride, ethylene oxide, ethylene dibromide, methyl ethyl ketone, methyl isobutyl ketone, methanol, methylene chloride, methyl chloride, pentaerythritol, perchloroethylene, phenol and phthalic anhydride.

"It is immaterial," he asserts, "whether the present volume of import competition on these chemicals be great or small. The fact of com-

PELLING significance is that tariff reductions would have as their objective an increase in the volume of imports into the U.S.

"Where domestic and export markets are insufficient to sustain domestic



**LENHER:** Wants consideration of specific tariff reductions.

production at a level needed for defense mobilization, it is a contradiction of our national policy of preparedness to consider any material reductions in duty."

Others appearing at the reciprocity information hearing in Washington are asking that tariff concessions not be granted on a number of very specific products.

Included: Merck on vitamins; Pfizer on vitamins, cream of tartar, caffeine, and mercurials; Pennsalt, Columbia-Southern and Olin Mathieson on calcium hypochlorite; Du Pont and Allied on sodium nitrite; Society of the Plastics Industry on various plastics; Abbott on barbiturates; Monsanto on caffeine, theobromine, phenol, saccharin and vanillin.

## Two to Get Ready

**In its second big expansion move of 1955, the Southern Chemical Division (formerly the Naval Stores Division) of the Glidden Co. will build a tall oil-fatty acids plant at St. Joe, Florida.**

Estimated cost: \$2.5 million; site: a tract of land adjacent to St. Joe Paper Co.'s kraft paper mill—just outside Pensacola.

Purpose of the plant will be to use crude, by-product soap skimmings from the Du Pont-controlled paper mill to produce tall oil, high-grade fatty acids, rosins, and pitch.

But the move, coming close on the heels of a general expansion of tall oil producing capacity last spring, could signal a general trend in general company expansion policy.

"Production, research and development work has been particularly promising in the Southern Division in recent months," admits Dwight Joyce, chairman and president. In the first 10 months of 1955, the division recorded profits in excess of its total for the entire 12 months of 1954.

## Tax Case Decided

**Processing companies that deal in commodity futures to assure themselves of a raw material supply and to reduce the impact of commodity price increases must, for tax purposes, treat gains and losses from such trading as ordinary income.**

That's the gist of a unanimous ruling by the Supreme Court last week in a test case brought by Corn Products Refining Co.

Corn Products argued that its corn futures were "capital assets" and that gains and losses on future sales should be treated as arising from sale of a capital asset for tax purposes, and thus be taxed at the lower capital gains rate.

Justice Tom Clark, who wrote the court's opinion, held that such transactions were "vitally important to the company's business as a form of insurance against increases in the price of raw corn."



OCAW'S CARBIDE COUNCIL: For broader bargaining, CIO union makes . . .

## Bold Start on Big Switch

Whether the chemical labor unions will succeed in their efforts to make the big switch from isolated plant-by-plant negotiations to coordinated, broader-base bargaining may depend on whether the company-wide council formed this month at Newark, N.J., will sink or swim on the bold course it's setting for itself.

In a two-day meeting in Newark's Continental Ball Room, Vice-President Joseph Appelbaum of the Oil, Chemical & Atomic Workers (CIO) set up a committee representing 18 local unions at as many plants of Union Carbide and Carbon's various divisions. This will probably be the largest company council in the industry for some time to come, and its achievements or failures are likely to determine whether the chemical unions will go all-out for this strategy or give it up as a bad job.

These are the benefits on which OCAW's Carbide council will seek company-wide improvements:

- Pensions.
- Insurance programs.
- Vacations.
- Paid holidays.
- General wage increases.

**Seeking AFL Linkage:** Before the merger with CIO Oil Workers last March, the old Gas, Coke & Chemical Workers had maintained a Carbide council that would meet occasionally to discuss bargaining objectives. The

new Carbide council is intended to be bigger, more active, and more solidly assembled. Its president—Norman Krieger, president of OCAW local 15-215 at Carbide's Linde Air plant at Niagara Falls, N.Y., and a member of OCAW's executive board—says that the council will offer to exchange data and ideas with other unions at Carbide plants; and that it will set up subcouncils for locals dealing with each of Carbide's major divisions. Vice-president of the council: Bernard Emerick, president of OCAW Local 10-639 at Carbide's Electro Metallurgical Co. plant in Marietta, O.

Appelbaum—now proceeding with plans to form eight more company councils on the same general lines—says experience has proved that when local unions band together in a coordinated program, they can make bigger gains in collective bargaining agreements with a large concern.

"Coordination of collective bargaining activities and programs of Union Carbide locals is a key purpose of this council," Appelbaum told delegates to the meeting. He implied an admission that Carbide has not been niggardly toward its 70,000 employees; but contended that "union people can do a better job than Carbide or any other corporation" toward raising U.S. standards of living. "We should not tear down what Carbide has done," he concluded, "without ourselves offering to do something better."

## 'Windfall' Wrangle

The courts are still trying to unravel some of the tangles stemming from pre-World War II trade pacts among German chemical and pharmaceutical companies and their former affiliates in the U.S.

Currently under litigation in two federal courts: contracts signed some 30 years ago itemizing a worldwide working agreement between Farbenfabriken vorm. Friedr. Bayer & Co. (Leverkusen, Germany) and Sterling Drug Co. (New York). (Originally, the U. S. party to this agreement was The Bayer Co., Inc., which had been set up by the German concern prior to World War I and later—after a few years of independence—merged into the Sterling organization.)

This week, General Aniline & Film Corp. is considering whether to appeal the recent decision by U.S. District Judge Edward Weinfeld that GAF should be barred from trying to collect an estimated \$3 million from Sterling under one of those contracts. That contract called for Sterling to pay to I.G. Farbenindustrie—the German chemical trust that had absorbed Farbenfabriken—50% of net profits on sale of certain drug products in Cuba for a period of 50 years; and back in 1930, I. G. Farben had instructed Sterling to pay the money directly to the Farben-controlled American I. G. Chemical Corp. that was the predecessor company to GAF.



JUDGE WEINFELD: On drug cartel deal, he won't enforce payments.

**'No Restraint' Argued:** Those Farben-Sterling contracts had been declared illegal in two consent decrees filed in 1941, and Sterling then stopped making the payments. After World War II, GAF—which was not a party to those 1941 antitrust actions and did not feel bound by the decrees—sued Sterling for payments for the years 1941 through 1951.

Sterling replied that the 1941 decrees made it impossible for Sterling to carry out the provisions of the 1926 contract. GAF's arguments for enforcement of the pact: (1) GAF and Bayer are in dissimilar and noncompetitive businesses; (2) no evidence of restraint of trade since 1941 has been introduced; and (3) pushing GAF's suit to recover those missing payments does not restrain trade.

The court's decision undercuts that reasoning. Says Judge Weinfeld: "When GAF alleges—as it must to succeed—that its assignor has duly performed the conditions of the agreement from 1923 through 1951, it is saying that I. G. Farben has withdrawn from competition in the areas allocated to others. Thus, recovery by GAF is conditioned upon proof of continued violation of the antitrust laws."

"To permit GAF to assert its claims is tantamount to giving the court's seal of approval to an illegal agreement, which is destructive of our national policy of keeping open the avenues of competition." To GAF's contention that such a ruling means an undeserved "windfall" for Sterling, Weinfeld answers that a court won't aid a party seeking to realize the fruits of an agreement "tainted with illegality."

**Contracts Still Binding:** Although those agreements are considered illegal in the U.S., they're not altogether dead. Last year, the U.S.-British-French I. G. Farben Control Group ruled that the contracts were not terminated, and that I. G.'s rights and obligations had been transferred to Farbenfabriken Bayer, one of the five I. G. successor firms.

And backed by that ruling, Farbenfabriken Bayer is now prosecuting its suit against Sterling in the federal court at Newark, N.J. (*CW*, Oct. 15, p. 16). The German firm wants its share of profits on sales in Britain, Australia and South Africa under another part of the agreement.



## Two Birds with One Stone

FOLLOWING the First International Conference on the Use of Antibiotics in Agriculture (held in Washington) last month, four U.S. drugmakers—Squibb Division of Olin Mathieson, American Cyanamid, Pfizer, and Merck—played host to a group of 410 scientists.

Including 60 leading foreign agricultural scientists from some 20 countries, guests were invited to view the U.S. companies' research and production centers, were invited to ask questions on any topic of interest to them.

At Squibb's Institute for Medical Research, for example, the visitors were shown plants treated with antibiotics to combat disease (see above). Later (also at Squibb) they viewed the difference in peach growth when trees are treated to curb "brown rot."

Purpose of the tour, of course, was primarily to interest overseas use of antibiotics in agriculture. But consensus of guests interviewed at the end of their journey was that the four U.S. companies also scored a big public relations hit.





**BRUCKER:** Has ordered a reorganization designed to cultivate a . . .

## Seed Bed of New Ideas

A program to aid the Chemical Corps in developing new germ and gas weapons—and means of defense against them—was put in motion last week by Secretary of the Army Brucker.

Basis for the renovations suggested by Brucker (and seconded by chief chemical officer William Creasy and a chemical warfare panel headed by George Merck) was a five-month survey of the Corps, made by a special advisory committee headed by Otto Miller, operations vice-president of California Standard Oil Co.

Specifically, the report contains 28 recommendations—many of them suggesting how to improve Corps management, shifting and changing responsibilities within the organization itself.

Other suggestions have substantial industrial importance, too:

- The Corps, the report suggests, should contract out to industrial concerns and educational institutions more work than it does. Such contracting should be done in basic research, laboratory techniques and application of industrial engineering and production know-how.

- The Corps should not have to buy chemicals for all three military services, as it is now supposed to do. Such procurement should be Corps responsibility only where it would be of "specific advantage to the military and would not interfere in any way

with the primary mission of the Chemical Corps."

- Since the Corps is not now operating its production units on a high level, it should place more of them in standby, and buy current chemical requirements from commercial firms.

- The Corps should integrate its work on biological warfare with its normal research management setup. Because of its nature, such activity—which accounts for more than half of the Corps' research spending—has been separate from general chemical and radiological research.

But of even more long-range importance to chemical companies is the report's frank appeal for public understanding.

Atomic energy, the report points out, is freely discussed, but much of the work of the Chemical Corps "has been assumed to be horrifying in character." It therefore pleads for recognition of the "proper place of chemical and biological warfare" and of the importance of defensive measures.

## COMPANIES

**Pennsylvania Salt Mfg. Co.** and **Hooker Electrochemical Co.** have jointly formed a new company—**Chemical Salt Production Co.**—to harvest salt from the Great Salt Lake in Utah.

Chemical Salt will operate on a 12,000 acre site, about 40 miles west of Salt Lake City. Initial capacity: 120,000 tons/year of salt, but company officials say the site lends itself to expansion to produce in excess of 1 million tons of salt annually—if required. Completion is scheduled for April 1, 1956.

**Can-Amara Oil Sands Development, Ltd.** (Calgary) has purchased (for \$200,000) the Alberta government's oil sands pilot plant at Bitumont, 250 miles north of Edmonton.

Can-Amara took an option on the Bitumont plant last year, plans to move immediately into commercial production of crude oil from oil sands.



## End of a Long Trail

ONE OF THE LARGEST surveys ever made by a state water pollution board came to an end last week. Covered in the eight-month survey (with cooperation of the U.S. Public Health Service) was a 3,000-sq.-mile tract in the Finger Lakes District of New York.

Headquarters during the sam-

pling was this trailer-type laboratory, manned by a team of four chemists and two engineers.

Data will be studied this winter in Albany, and a report on the amount of pollutants in upper New York state water will be turned over to the control board—with recommendations—sometime next spring.

## Washington Angles »

» **In a late Salk polio vaccine report** by the Public Health Service last week, the agency says it discovered live virus in every one of six suspect lots of vaccine produced by Cutter Laboratories. Such virus as was found, it claims, would have been detected by later-tightened safety tests.

» **An acetylene-making plant** at the Long-Beach, Calif., naval base will be closed if the Defense Dept. has its way. Final decision on the matter won't be made until Congress reconvenes in January, however.

» **Higher minimum wages** must henceforth be paid by pulp and paper makers for work on products they sell to the government. Under terms of the Walsh-Healey Act, new minimums will have to be \$1.115 an hour, up from 75¢/hour. Labor Secretary Mitchell also has filed notice that he plans a boost for photographic supply makers from 75¢ to \$1.18.

» **Russian engineering schools** graduated 42% more engineers and scientists than did the United States between 1928 and 1954. That's the conclu-

sion of a two-year study conducted for the National Science Foundation—which views the situation with alarm.

Also worried: the Manufacturing Chemists' Assn., which will tell next week's White House Conference on Education that special efforts are needed to increase number and scope of mathematics and physical science courses in secondary schools.

» **Is the paperwork** chemical companies prepare for federal officials too great? That's the question asked by a new task group being organized by the Advisory Council on Federal Reports. Dow's Lewis Lloyd is serving as chairman. If you feel that federal agencies do require too much paperwork, let the council know. Address: 1001 Connecticut Ave., Washington 6.

» **Personal high-income tax levels** are drying up future sources of industry executives, says Du Pont's Crawford Greenewalt in a statement published this week by a Congressional group planning hearings on federal tax policy. Greenewalt sees a "black and static future" for industry if current high-income tax policy is not modified. Complete report—recommendations of 80 tax and industry experts on 17 questions covering future of federal tax policy—is available from Government Printing Office, Washington 25. Price: \$2.50. The experts will take part in hearings to be held next month.

**Scott Paper Co.** will buy 1 million shares of stock from British Columbia Forest Products, Ltd. (Vancouver, B.C.).

The purchase will be made in cash installments over the next two years, and when Scott acquires its full million shares, it will hold about 29% of B.C. Forest Products' common stock outstanding.

**National Propane Corp.** has contracted to buy Shell Oil Co.'s bottled gas business in nine Midwestern states. Purchase price: \$10 million.

The acquisition will be financed, according to National Propane officials, by sale of \$5 million in 4¾% 15-year notes to two New York life insurance companies, and by public offering of common stock.

**An investment syndicate**, headed by Lee Higginson Corp. and P. W. Brooks & Co., Inc., is offering publicly \$2.25 million of first mortgage bonds and 225,000 shares of common stock of Dixon Chemical and Research, Inc.

Dixon plans to use the proceeds to

finance a new sulfuric acid plant in Newark, N.J.

**Drug Corp. of America** has filed a charter of incorporation in Dover, Del. Authorized capital stock: \$250,000.

### More three-quarter earnings:

- For Food Machinery & Chemical Corp.: sales, \$197.1 million; net after taxes, \$11.6 million.

- For Michigan Chemical Corp.: sales, \$5.2 million; net after taxes, \$203,552.

- And for The Glidden Co. (for a 10-month period, ending Aug. 31): sales, \$180.5 million; net after taxes, \$7.1 million.

## EXPANSION . . .

**Aluminum:** Work has started on expansion of Reynolds Metals Co.'s aluminum reduction plant at Listerhill, Ala.

Due to cost an estimated \$11 million, the plant's aluminum-producing capacity will be increased from 100 million to approximately 140 million

lbs. of primary aluminum annually.

All work should be completed, company officials say, by Aug. '56.

**Aldehydes:** Texas Eastman Co. will expand its Longview, Tex., facilities for producing aldehydes.

Capacity of both n-butyraldehyde and isobutyraldehyde will be increased; completion is scheduled for fall, 1956.

**Sulfur:** Canadian Gulf Oil Co. will build a 225-long-tons/day sulfur plant at its Pincher Creek field, 105 miles south of Calgary.

Construction starts immediately; completion is scheduled for Sept. '56.

**Plastics:** Dow Chemical Co. has selected acreage at Ironton, O., as site of its contemplated new plastics plant. The plant, when completed, will be the first chemical unit constructed on the Ohio side of the Ohio River since work was started on the Bakelite (division of Union Carbide) plant at Marietta in 1949.

Construction of the Dow plant is expected to be completed by fall of 1956.



# How Wyandotte Pluronics improve dye leveling

The Pluronics are a unique series of 100%-active nonionic surfactants based on a chemical concept not previously used in the synthesis of nonionics, utilizing a polyoxypropylene base as the hydrophobic unit.

The first commercial example of a block-polymer-type surface-active agent, Wyandotte Pluronics range in molecular weight from 1800 to 8000 (usual molecular-weight range for surfactants: from 300 to 700).

The Pluronics' advantages can only be realized through thorough laboratory investigation. Evaluate the Pluronics as the basis for a new approach in dye leveling . . . they may be the key to dyeing concepts that open up new avenues of progress for your company.

Pluronics' over-all balance of desirable properties also makes them suitable for use in other textile applications . . . these properties include:

1. Stability throughout the entire pH range
2. Compatibility with metal ions
3. Excellent dispersing properties
4. Good penetration
5. Extremely low to moderate foaming properties
6. Liquid, paste, or flake forms — all 100% active

## Why are the Pluronics unusually helpful in textile processing?

Wyandotte Pluronics, a new series of 100%-active surface-active agents, are non-hygroscopic, neutral, and salt-free — and consequently are compatible with the oils, soaps, anionics, and cationics used in textile processing.

The Pluronics have excellent soil-removal properties, and hold lubricants, sizes, finishes, and dirt in suspension so they can be flushed away without redeposition onto textile fibers. Colored goods are left clear and bright.

What's more, the Pluronics do not combine with calcium or magnesium salts, and have excellent detergent action in hard or soft water — even at low concentrations and low temperatures. In fact, they are outstanding for their effectiveness in scouring without sudsing excessively.

The Pluronics rinse and drain freely . . . their dispersing properties, combined with their stability throughout the entire pH range, makes them particularly useful in acid baths.

## Improve leveling of wool dyes

In the dyeing of wool, it has been found that Pluronic F68 effectively disperses, suspends, and aids the penetration of both acid and chrome dyes — helping to produce colors that are bril-

liant, clear, and level. It is also an effective solubilizing agent for many dyes which are normally difficult to put into solution.

Pluronic F68 produces excellent results as an assistant with certain unlevel-dyeing acid dyes, and metal-complex dyes. One of the most successful applications of Pluronic F68 is its use as a dye dispersant and diluent for dyes that can be applied to woolen fabric with a peroxide bleach — permitting bleaching and dyeing at the same time, and eliminating a step in the processing. F68, added to the dye, forms an integral product; no other additives are required to obtain level dye shades.

## Better leveling of cotton dyes

Improved leveling of both direct and vat dyes can be achieved with Pluronic F68 in the dyeing of cotton. Excellent leveling and good penetration can be obtained with the rapid-exhausting direct dyes. And substantial improvement of certain difficult-to-reduce vat dyes is possible. F68 is also useful as a dispersing agent for diazo salts which form diazonium dyes directly on the fabric, for it is stable to the acetic acid added to the bath as an after treatment.

Pluronic F68 produces very level shades in package and skein dyeing. Used with naphthol

## Report on Wyandotte Pluronics\*

# in wool, cotton, synthetics

dyes, wetting of the fabric by the naphthol solution is enhanced, naphthols are kept in solution, and crocking is eliminated.

Because Pluronic F68 has no cloud point, it offers the advantage of being soluble in the dye bath at any temperature.

### Pluronics for synthetics

Pluronic F68 is exceptional as a dye assistant for synthetic and synthetic-wool mixtures, spun nylon, and acetate rayon. In treating blends of wool and certain synthetics with basic dyes, staining of the wool is retarded. This same retarding quality suggests the use of F68 when poorly leveling direct dyes must be used.

Pluronic L64 and F68 have proved successful in rayon processing and rayon pulp treatment . . . F68 has been found good for incorporating pigment in rayon yarn.

Other Pluronic grades also offer promise in textile processing. For instance, Pluronic L61 has virtually no foam in most systems. The L61 grade is being successfully employed as a foam suppressant, vastly reducing the foam of soaps and other nonionic detergents and wetting agents.

### How about other applications?

Wyandotte Pluronics are used in water conditioning, in the manufacture of cellophane, in shampoos, boiler-water compounds, mechanical-dishwashing compounds, home and laundry detergents, and in metal-cleaning formulations—to name a few.

New applications are being reported continually.

Pluronics are not just another nonionic surfactant . . . sales to date have clearly established this fact. Because the Pluronics are unique and different, the greatest progress has been made in the shortest possible time by those who have evaluated them carefully and thoroughly.

A thorough evaluation, including reformulation with any *one* of the Pluronics series, will not only provide you with data on the benefits to be gained from the Pluronic tested, but will offer an easy starting point for arriving at the right Pluronic grade to use for your specific requirements.

### To find out more about the Pluronics:

Call your local Wyandotte representative, or write us direct. We will supply the proper samples of the Pluronics, a data sheet summarizing their physical and surface-active properties, technical information on the use of the Pluronics in textile processing, and prices. Write us today . . . or use the coupon below.

WYANDOTTE CHEMICALS CORPORATION, WYANDOTTE, MICHIGAN. OFFICES IN PRINCIPAL CITIES.

\*REG. U.S. PAT. OFF.



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Wyandotte Chemicals Corporation  
Inquiry Section CW, Wyandotte, Michigan  
Please Send:

- ☐ New data sheet on the use of Pluronics as dye assistants
- ☐ Samples of Pluronic F68 (flake) and L61, L64 (liquids)
- ☐ Data on Pluronics for (state application): \_\_\_\_\_
- ☐ Have your representative call on me

Name \_\_\_\_\_

Firm \_\_\_\_\_ Title \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_



**EMPHASIS:** Connelly (left) flags out speech highlights.



**CHOICE:** From a storehouse of aids, assistant

## No Chance of Speakers' Slip-ups

**There's no substitute for finesse. That, in a nutshell, is the thinking behind Bakelite's (division of Union Carbide) emphasis on speech training for executives.**

From a public relations standpoint—not to mention sales—the value of a well-trained, professional-appearing speaker is invaluable to any company. Multiplied a hundredfold, it becomes a foremost concern to executives and stockholders alike.

Recognizing this simple fact, Bakelite today has a full-time speech counsel, William Connelly, specifically assigned to advise management on the art of rhetoric.

It's Connelly's job to pilot speeches in advance—it's his responsibility to provide all necessary stage props, to rehearse, advise, and coach all company orators.

In scope alone, that's a formidable task. Last year, for example, company personnel chalked up well over 100 addresses, technical as well as general. Audience profiles ran something like this:

- 63% of the addressed groups were trade associations.
- 15% were industry gatherings, company supervisory clubs, key personnel.
- 13% were civic and business circles—Rotaries, Chambers of Commerce, etc.
- 9% were educational institution audiences—colleges, high schools.

**Why the Emphasis?** Why the increased emphasis on speech presentation today? For one thing, Connelly

says, audiences are becoming more and more discriminating and critical of speakers (TV is probably one influence).

Then, too, because the chemical industry is growing steadily more competitive, it's only natural for companies to strive to outdo one another whenever an opportunity is afforded.

Commenting on the importance of this factor Connelly says, "We feel at Bakelite that when our company men are called upon to address public and industry groups, they've got to do a first-rate job every time."

There's still another, more basic, reason why Bakelite actively supports

speech work for executives. "The company's convinced," says Connelly, "that if an executive can take valuable time to deliver a talk, it (the company) can afford to supply the wherewithal to make that speech a successful one."

**Staunch Support:** Right now, as Bakelite's speech department is set up, Connelly is granted one assistant and two secretaries to handle the myriad details of coordinating the company's speech program. Furthermore, he has access to the talents of some eight technical writers from Bakelite's advertising department to assist executives in preparing talks.

On this point, Connelly cautions,



**INSPECTION:** Preopening preview is run on slides.



Scott (left) helps choose equipment.



PRACTICE: Technical man Reisig (right) gets briefed on pointers.

"let's get it straight. Our function is not to 'ghost' a man's speech. We simply try to grant him every aid possible, that he may give a better one. Sincerity, conviction and background on any subject worthy of a speech should come from speakers themselves," Connelly says.

But, on the other hand, Bakelite's service department is always ready to:

- Advise on the most effective ways of presenting speech material and suggest what audio-visual aids, charts, slides or movies should be used.

- Secure speech material, or check already available information for accuracy and appropriateness.

- Expedite company approval of speeches.

As an extra lift: after speeches and speakers have passed Connelly's basic

requirements, he then offers to dress-rehearse a performance in his own "specially equipped office. (Whether an individual accepts this offer is, however, strictly his own decision.)

**A-V Aids Important:** Another important facet of the speech expert's job is keeping abreast of the latest in audio-visual aids. Today Connelly's department numbers some 40 devices—lecterns, pointers, projectors, screens, microphones, etc.—available to company speakers. But there's a danger lurking in the use of such aids, Connelly warns.

"We must be extremely cautious," he says, "to avoid speakers' using audio-visuals as gimmicks instead of auxiliaries to their presentations." The aids, he believes, must serve only to make the impact of speeches more

forceful. Use of A-V aids for sheer effect is out.

Often, after analyzing the problems of a particular speaker, Connelly recommends that no aids be used at all. Or, as is more often the case, when a speaker plans to use a device like slides, Connelly suggests a "slap board"\* or some simpler device instead.

**Precautions Far-Sighted:** In carrying out its prescribed functions, Bakelite's speech department takes far-sighted precautions to insure maximum success for its speakers.

For example, Connelly provides them all with a kit to be used in an emergency. Should any speaker suddenly find himself confronted with a need for extension wires, plugs, extra light bulbs, or tape, he finds them all instantly at hand.

Or, if a Bakelite speaker is making an important speech in which a movie plays a prominent role (as in a film preview), Connelly insists that two projectors be run in tandem (one with light and sound off). Should one projector fail, the other can be thrown on immediately with no apparent lapse in film continuity. Result: audiences don't get a chance to grow restless or antagonistic because of delay.

**Intangible but Real:** Dollars-and-cents benefits of so intangible a program are, of course, impossible to gauge.

However, Bakelite management is convinced—and backs its conviction with continuing support—that the benefits are nonetheless real.



REHEARSAL: A final check is a test run on delivery.

\* A flock or magnetic board permitting displays to be built up in full audience view.

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## BUSINESS & INDUSTRY . . . . .

### Highlights of Recent West German Surge . . . . . . in Plastics Production

(in tons)

	1953	1954	1955 (est.)
Plastics from cellulose derivatives	33,300	39,600	45,000
Synthetic resins and molding compounds			
Condensation products	90,900	113,400	142,000
Polymerization products	96,300	137,700	190,000
<b>TOTAL</b>	<b>220,500</b>	<b>290,700</b>	<b>377,000</b>

## FOREIGN . . . . .

**Plastics/Germany:** In the wake of last month's Plastics Exhibition in Dusseldorf, West Germany, come figures on estimated German output of plastics this year.

Despite a tremendous increase scored in 1954, German producers are now predicting they'll boost output by 30% again in 1955. Sales, running not far behind, jumped 25% in 1954, should score another 20-25% gain this year.

Reason for much of the progress: higher overseas sales—which doubled to 55,000 tons in 1954.

**Butyl Rubber/France:** The Société du Caoutchouc Butyl (SOCABU)—a consortium of 10 rubber, chemical, and petrochemical companies—will build a 20,000-metric-ton butyl rubber plant in the Basse-Seine sector of France.

Estimated date of completion: mid-1958.

**Synthetic Rubber / Great Britain:** The Dunlop Rubber Co. has started construction of a £1.5-million synthetic rubber plant in Great Britain.

Basically, say Dunlop officials, the plant is intended for experimental purposes; but there will be 2,000 tons of synthetic rubber for sale annually.

No date of completion has as yet been released.

**Aluminum / South Africa:** A six-man delegation, representing the Gold Coast national committee on the Volga River aluminum project in Africa, has returned to Johannesburg after a tour of Canadian aluminum developments.

Led by the Gold Coast's finance minister, Kimla Agbeli Gbedemah, the delegation visited Aluminum Co. of Canada's big smelting plant at Kitimat, is reported to have agreed that the Gold Coast, like British Columbia, will shortly have its own Kitimat—with a maximum capacity of 210,000 tons/year of aluminum.

**Ilmenite/Ceylon:** The Ceylon government is expected to make a decision within the next 10 days on award of a concession to exploit ilmenite deposits in the northeast sector of Ceylon.

Strongly favored: a Ceylonese firm that has a tie-in agreement with Krupp (the German prewar munitions maker) to build a Rs 7-million ilmenite plant.

Several prominent U.S. chemical companies are reported to have offered tenders; none, however, stands much chance of gaining the Ceylonese government award.

**Rayon Acetate/Cuba:** Installation of a rayon acetate plant in Guanajay, Cuba, seems a definite possibility this week.

Local manufacturers have already submitted construction plans to government authorities in Havana; financing arrangements are already completed; land grants have been obtained.

**U.S.-French Accord:** The Du Pont Co. has completed negotiations with the Comptoir des Textile Artificiels (Paris), licensing production of high-tenacity rayon yarn to the French firm. No monetary arrangements have as yet been revealed.



One of 3 fueling points at Matlack Terminal. In background is Terminal point shop.

## Matlack sets new standards for clean hauls with 103 Butler Aluminum Transports

E. Brooke Matlack, Inc., of Philadelphia does things in a big way. Its fleet of 600 transports travels 2 million miles a month. It hauls 300 different liquids. It serves customers in 21 states. In short, it's one of the largest liquid haulers in the country.

When Pennsylvania lifted its weight limit recently, Matlack acted fast . . . and big. It ordered 110 trailers from Butler, 103 of them aluminum—a dramatic demonstration of confidence in Butler's pioneering and leadership in the development of aluminum transports.

Maximum payload under the new state code was only one of the reasons for ordering Butler aluminum. In addition, aluminum's non-toxic quality and high resistance to corrosion would offer Matlack customers

assurance of pure and uncontaminated deliveries.

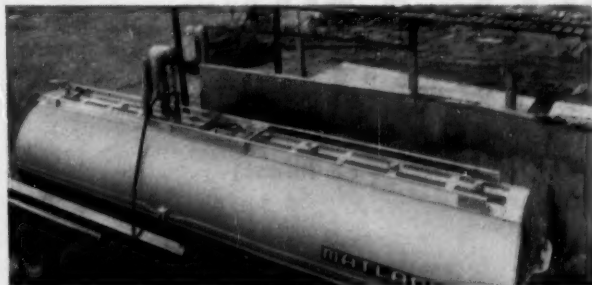
Increased safety in hauling flammables would be provided by aluminum's non-sparking characteristic. And because aluminum is non-catalytic, Matlack could handle sensitive chemicals and oils with a minimum of oxidation, polymerization or decomposition.

Also important to Matlack are many Butler engineering refinements, such as fast-flow piping, better rear-view visibility, and greater ease and speed of cleaning. Special design permits thorough *automatic* cleaning and drying in one hour, compared to 24 hours of *manual* labor with the old Matlack units. This results in faster dispatching and faster delivery.

If you would like full information on Butler aluminum transports, mail coupon below.



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Caption Chemical Name	Dowanol 7 Ethylene Glycol Methyl Ether	Dowanol 8 Ethylene Glycol Ethyl Ether	Dowanol 10 Ethylene Glycol n-Butyl Ether	Dowanol 16 Diethylene Glycol Methyl Ether	Dowanol 17 Diethylene Glycol Ethyl Ether	Dowanol 19 Diethylene Glycol n-Butyl Ether
Specific Gravity @25/25°C.	0.963	0.9275	0.899	1.018	0.9855	0.952
Boiling Range 5-95% @760m.m.Hg °C °F	123-126 254-258	133-136 271-277	166-173 330-343	189-195 372-383	197-203 387-397	225-233 437-450
Viscosity CPS@25°C	1.532	1.838	2.83	3.467	3.780	4.92
Flash Point °F (COC)	125	110	160	210	205	225
Dilution Ratio: Toluol L.D. Naphtha	4.0 0.3	5.2 1.1	3.3 1.8	2.3	1.9 0.2	
Solubility	All Dowanols infinitely soluble in water and practically all commercially available solvents					

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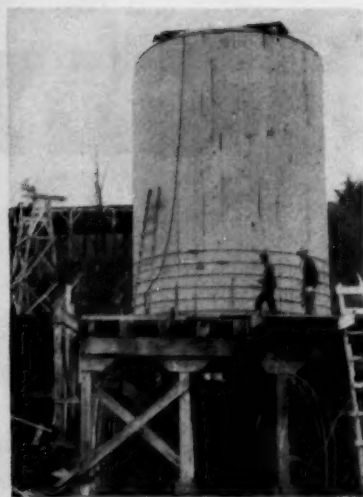
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PLASTICS, ZINC PLANTS: In New York and Tennessee, they're involved in lawsuits over alleged sales agreements. WIDE WORLD

## 2 Plants, 1 Sale, 2 Suits

Neat, tidy handling has characterized the past three years' series of chemical mergers and acquisitions. But two lawsuits have popped up this fall in the wake of negotiations.

With little or nothing in writing, the plaintiffs are up against long odds in their 'breach of contract' actions.

In New York, the sale of a chemical process plant went through, and in Tennessee, a similar plan fell through. But in each case, there's a man in court asserting that he's entitled to several hundred thousand dollars on the deal.

These cases are exceptions to the general pattern of chemical company stock and property transactions over the past three years, during which there have been numerous mergers, plant and site purchases, and unsummated negotiations looking toward such deals—all with little or no kick-back in litigation.

Significant about these two cases: both appear to be based on what were understood or misunderstood to have been oral agreements.

**Finder's Fee Demanded:** In Buffalo, N. Y., a businessman living in nearby Williamsville is demanding a finder's fee of \$250,000 in connection with the recent merger of Durez Plastics & Chemical Co. with the considerably larger Hooker Electrochemical Co.

This suit has been filed by Chandler Wells, an insurance dealer, against Harry Dent, former president and a principal stockholder of Durez. Wells

states that Dent—as owner of 22.4% of outstanding Durez stock and as an associate of other major shareholders—had been trying in vain last year to sell the company.

Last Dec. 11, Wells goes on, Dent told him that the latest attempt to sell—reputedly to a Belgian concern—also had failed. At that point, according to the complaint, Wells offered to endeavor to find a purchaser, with the understanding that he would be paid a percentage of the selling price. Wells asserts that it was his efforts—predicated on that alleged understanding—that led to the \$50-million merger.

Dent denies the main points in that complaint, but admits he owned 22.4% of Durez stock. He's asking for a bill of particulars, and Wells' attorneys want to question Dent in a pretrial examination. Hooker is not a party to the suit and is not commenting on it.

**'Restraint of Trade' Denied:** The other suit involves the Appalachian Mining & Smelting Co. and its zinc oxide mine and refinery at Embreeville, Tenn.

George Warren—an officer of that company while it was operating under

a \$3.5-million contract with the government, 1950-54—says he represented the stockholders in liquidation, and that the General Services Administration had agreed to give him an opportunity to purchase the property. He relates that he interested National Lead Co. in sending a geologist and a metallurgist to the site, and that they reported that the works could produce a \$4-million profit after taxes.

Further negotiations, he continues, led to an agreement that National Lead would invest \$500,000 to form a corporation and buy the property. He says National Lead repudiated this alleged agreement after conferring with Sherwin-Williams Co. officials; and Warren is directing his suit against both those firms, charging them with "an unlawful agreement in restraint of trade" whereby National Lead would buy all its zinc oxide from Sherwin-Williams.

He's asking \$225,000 judgment against each defendant.

National Lead denies that it ever made any agreement with Warren, and both companies deny any "restraint of trade" pact with each other. National Lead does admit that its officers conferred with Warren about the Embreeville plant and that it had the property inspected.

There's little chance that important precedent will be set in these cases. But they do point up the danger of "oral misunderstandings"—embarrassing and potentially expensive—in negotiations of this kind.

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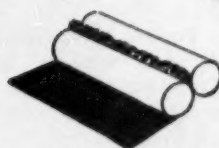
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CW-11



**FOSTER:** Says decision is near on Olin Mathieson's . . .

## Aluminum Site Search

Aside from a final decision on just where it will build its proposed \$74-million primary aluminum plant, Olin Mathieson is ready to roll this week.

Rumors persist that company executives will favor a West Virginia location (see *Business Newsletter*, Nov. 12, p. 14), but William Foster, Olin Mathieson executive vice-president (and former permanent president of the Manufacturing Chemists' Assn.) asserts that no final commitment has been made.

Foster admits, however, that the search for a plant site has currently narrowed to a tri-state area—southeast Ohio, northwest West Virginia, eastern Kentucky. And it's perfectly possible, he agrees, that a verdict could come before December.

Olin Mathieson is engaged in discussions with American Gas & Electric Co. and Pittsburgh Consolidation Coal Co. regarding power for the project. But, Foster notes, American Gas & Electric's strong grid system in the tri-state region is such that it won't to any marked degree, influence choice of a plant site.

**Government Backing:** To ease the financial strain of its aluminum plant expansion, Olin Mathieson holds a \$79-million certificate of necessity from ODM.

Originally granted a certificate for \$125 million in 1952, the company asked for and received a cutback in estimate (to \$79 million) and a year's

extension of its write-off last June.

But plans have changed slightly.

At last count, Olin Mathieson figured the plant will actually cost somewhere in the neighborhood of \$74 million to build; capacity will be 60,000 tons/year.

Facilities will be designed to include a reduction mill, an aluminum plant and a rolling mill. Output will be used, chiefly, to supply the company's own requirements for sheet aluminum.

**Another Decision Pending:** Meanwhile, in Pennsylvania, consideration is still being given to whether or not St. Joseph Lead Co. and Pittsburgh Consolidation Coal Co. will go ahead with their proposed aluminum plant.

The joint venture has been reported as an \$80-million project, but, unlike Olin Mathieson, the companies have received no government tax write-off grant.

Possible power sources have been discussed with the Duquesne Light Co. of Pittsburgh—but the companies' problem is largely that of how to arrange financing.

Outlook for government assistance: very slight under current ODM policy.

## Mainly Psychic

In a move by Commerce Secretary Sinclair Weeks last week, the U.S. cut some more of the red tape involving sale of nonstrategic goods to Russia and her European satellites. But the effect of the tape-slashing should have more psychological value than actual aid in promoting East-West trade.

What Weeks did was to make it possible for U.S. exporters to ship another long list of so-called "peaceful items" under general license to European Iron Curtain nations. Included: phosphate rock and rosin. Judging from past experience, dollar-short Communists countries aren't especially interested in buying such items, anyway. The Soviets, industry and government experts have noted, are much more interested in driving a big hole in East-West trade control on strategic items than they are in spending what little foreign currency they have on nonstrategic items. Thus, there should be little real impact, because of the change in rules, on U.S. chemical makers.

## New Pitch, Old Argument

IN THE HEATED fluoridation battle in British Columbia, supporters of artificial fluoridation of municipal water supplies are toting about a 40,000-year-old, 10-lb. elephant's tooth as "exhibit A" in favor of their case. The massive molar (see cut) belonged to an early-edition elephant, which found its way to the Puget Sound area by crossing the Isthmus from Siberia.

Its perfect condition, so the reasoning goes, is largely due to the mammoth's diet—chiefly seaweed, plants and bark—which supplied prehistoric animals with large amounts of natural fluorides.

The majority of municipalities (comprising the lower mainland of British Columbia) are still rejecting introduction of fluoridation; only the cities of Vancouver and Port Moody currently favor the plan.

Actually, Water Board members



point out, the city of Vancouver has enough voting strength to force fluoridation through, but members feel it's wisest to wait—pending popular acceptance.

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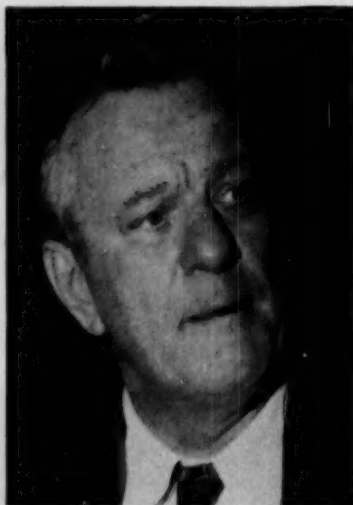


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## BUSINESS & INDUSTRY . . . . .



**CIO'S LIVINGSTON:** To lead organizing drive, a Reuther protégé.

## LABOR . . . . .

**Merger Details Set:** More details have been arranged for the upcoming merger of AFL and CIO, and a veteran of industrial-type unionism has been selected to head the new group's unified drive to organize the unorganized workers. John Livingston, a vice-president of United Auto Workers (CIO) and a protégé of CIO President Walter Reuther, has had nearly 20 years' experience in organizational work in the auto, aircraft, and agricultural implement industries. He can be expected to try to carry out the Reuther objective of intensifying membership campaigns in the chemical and petrochemical industries.

One of the fine points ironed out at a recent meeting of the AFL-CIO unity committee was to clarify a provision in the proposed AFL-CIO constitution for settlement of jurisdictional claims that overlap. The wording appears to mean that AFL Chemical Workers and the CIO's Oil, Chemical & Atomic Workers will not absolutely have to merge—although this is probably what they'll try to do. An alternative might be a voluntary agreement stipulating jurisdictional preserves in terms of plants, cities, companies or processes.

**Setbacks in South:** Livingston can be counted on to make it an early item of business to look closely into organized labor's continuing difficulties in signing up Southern workers (CW,

Nov. 12, p. 34). Latest example in the chemical field: At Port Neches, Tex., the Oil, Chemical & Atomic Workers Union (CIO) suffered its first loss in a plant election at any of the community's six largest industrial plants. Although this union is the bargaining agent for production workers at all six plants and for clerical workers at four plants, it lost by 15 to 27 in an election for office workers of Goodrich-Gulf Chemicals.

**Finer Delineation:** Labor laws are ever in the process of being more fully defined. Among recent rulings:

- In Ohio, according to that state's supreme court, it's illegal for a union to picket as a means of pressuring employees into joining. Picketing, the court suggests, is lawful only when there's a dispute between the union and the employer—not between the union and the employees.

- New York's Attorney General Jacob Javits has agreed that so-called guaranteed annual wage payments may be used to supplement state unemployment compensation in his state; but he'd like the legislature to amend the law to eliminate any doubt on the matter.

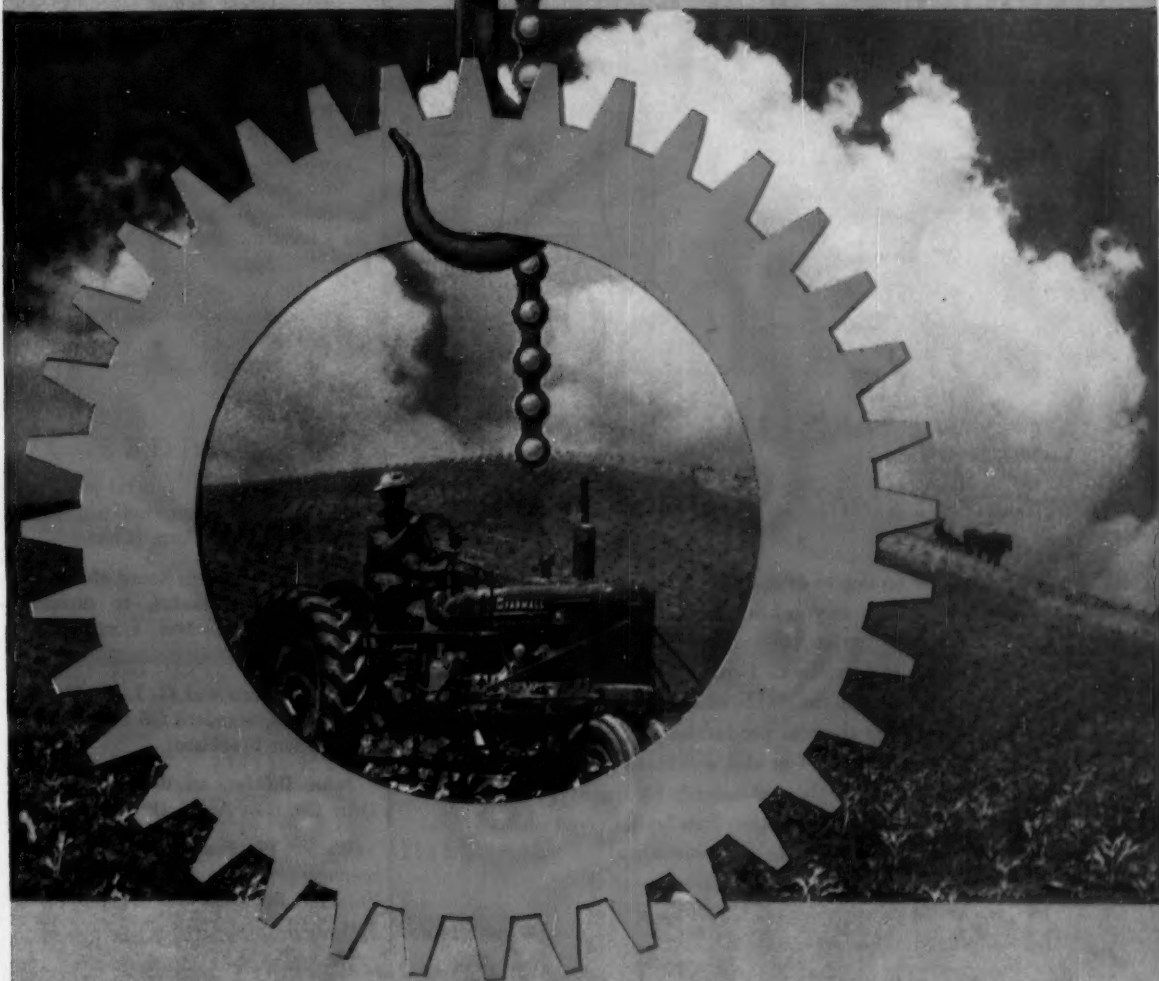
## LEGAL . . . . .

**Exports to China:** The U.S. Bureau of Foreign Commerce has cracked down on a Dutch concern that was found to have circumvented U.S. regulations in connection with shipments of chemicals into "Iron Curtain" countries. Due to lose all U.S. export privileges for two years or more is Stemmler-Imex, N.V., found to have bought from U.S. suppliers two tons of red phosphorus (transshipped into East Germany) and 2,000 metric tons of borax and 30 metric tons of boric acid (transshipped to Communist China).

**Patent Pointers:** Three chemical and pharmaceutical patent developments enliven the week's news:

- At Baltimore, the federal district court has upheld its previous finding that Minnesota Mining & Mfg. Co. is entitled to damages for infringement of its patent on a reflective paint used as highway center striping. Final judgment against Baltimore Paint & Color Works and Prismo Safety Corp. came after the two defendant com-

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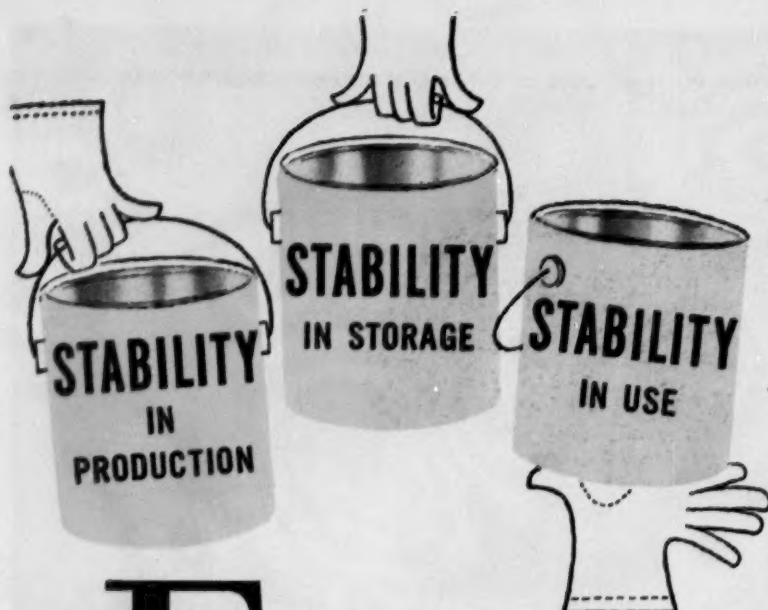
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**B & I. . . . .**

panies decided to drop their appeal of the earlier ruling to the circuit court.

- In Bloomfield and Rahway, N.J., Schering Corp. and Merck & Co. have signed a cross-licensing agreement that appears to eliminate a potential dispute over manufacture and sale of prednisone and prednisolone, anti-arthritic drugs.

- In Brooklyn, N.Y., Chas. Pfizer & Co. is hoping that its position in the tetracycline patent lawsuits will be strengthened—morally if not materially—by its being granted patents on the broad-spectrum antibiotic by seven more foreign governments, making a total of 13.

**Suits on Sewer Blasts:** Whether a person who suffered loss or injury in the Cleveland sewer explosion (*CW*, May 22, '54, p. 30) can collect from either the city or the industrial concerns that released chemicals and fuels into the sewer is to be tested in 91 suits for a total of \$2.8 million damages.

### KEY CHANGES. . .

**Carl A. Arend**, to general manager, Potash Division, International Minerals & Chemical Corp. (Chicago).

**Walter Gramm**, to board chairman, and **James C. Skakel**, to director, Great Lakes Carbon Corp. (New York).

**T. L. Lenzen** and **G. L. Parkhurst**, to directors, Standard Oil Co. of California (San Francisco).

**John Bowles**, to director, Rexall Drug Co. (Los Angeles).

**Walter W. Peacock, Jr.**, to sales manager, polyvinylchloride division, Escambia Bay Chemical Corp. (Shreveport, La.).

**Donald V. Sarbach**, to director, research, Hewitt-Robins, Inc. (Stamford, Conn.).

**John J. Dunphy**, and **A. L. Boschen**, to members of the finance committee, Vick Chemical Co. (New York).

### KUDOS . . .

To **Edgar C. Britton**, director, Edgar C. Britton Research Laboratory, Dow Chemical Co. (Midland, Mich), the Perkin Medal, American Section, Society of Chemical Industry, for 1956.



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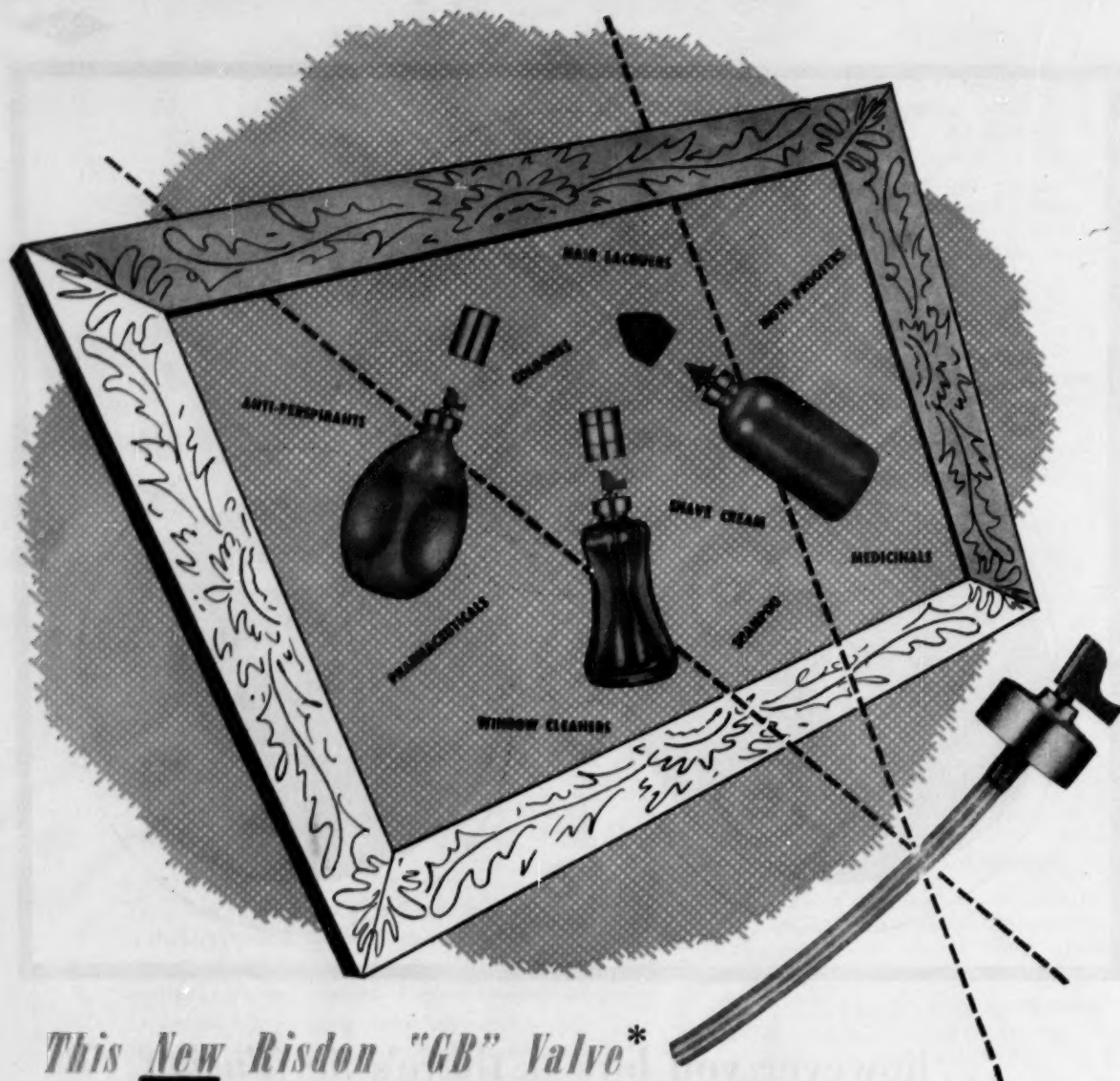
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\* Patents Applied For.

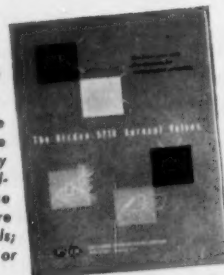


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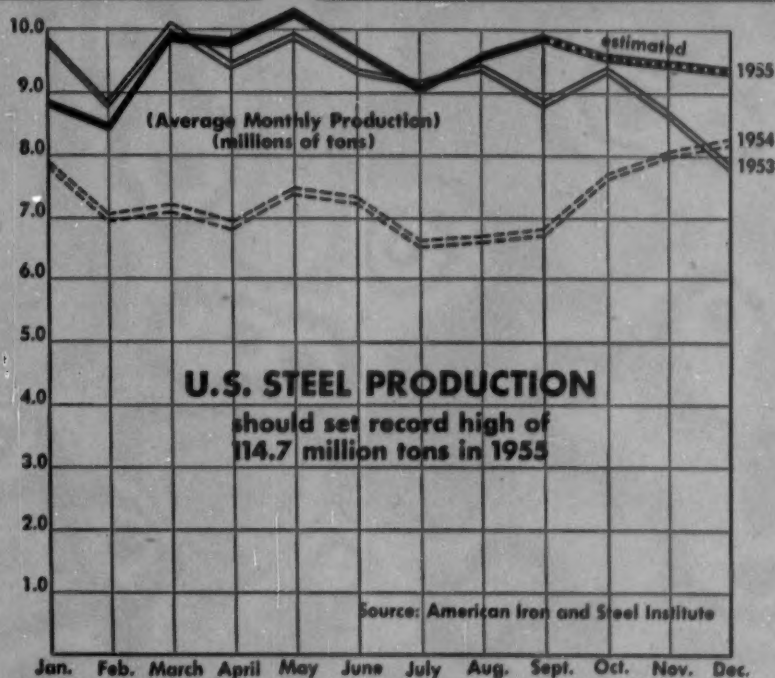


RI-34-A

# Charting Business

CHEMICAL WEEK  
NOVEMBER 19, 1955

## BENCHMARK FOR INDUSTRY



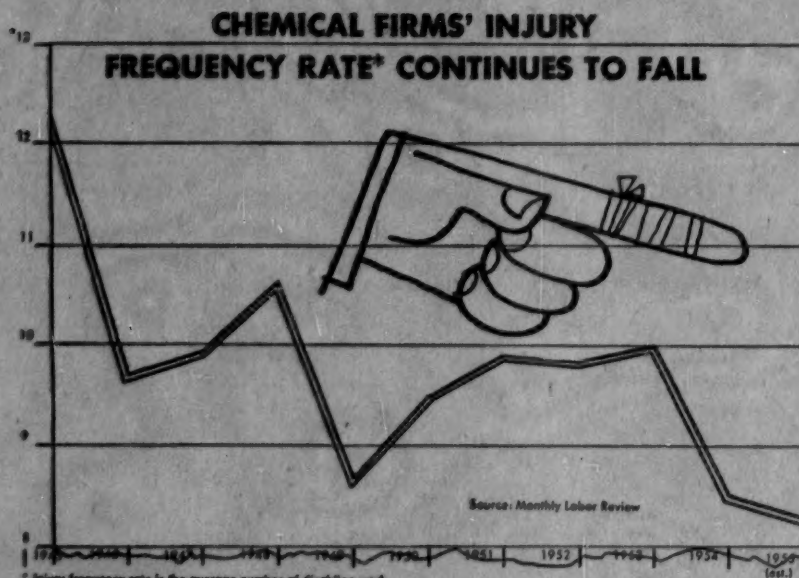
**D**ESPITE record steel production this year, U.S. producers will still have to expand at a rate of between 2.5 million and 4 million tons/year to meet consumer demand. That is the consensus this week as the steel squeeze tightens in major industrial areas. The real worry, pro-

ducers admit, is for the first quarter of 1956.

Then, unless the steel flow can be speeded up, many firms contemplating major expansion projects may have to defer construction schedules, or pay premium prices for the vital metal.

## Charting Business

(Continued)



\* Injury frequency rate is the average number of disabling work injuries for each million employee-hours worked.

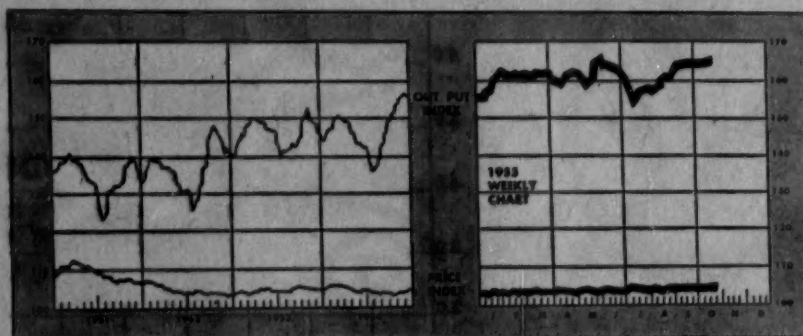
**T**HANKS to the combined effort of management and labor groups within the chemical process industries, the injury frequency rate (*defined above*) has today fallen to an all-time recorded low.

Whereas in 1945 the rate was an aver-

age 12.2 disabling work injuries for each million employee-hours worked, that figure in 1954 had dropped to 8.4 disabling injuries.

And this year, if 10-month estimates hold true, the record could be even lower—an average of 8.1 injuries.

### BUSINESS INDICATORS



#### WEEKLY

	Latest Week	Preceding Week	Year Ago
Chemical Week Output Index (1947-49=100) .....	168.9	168.7	155.8
Chemical Week Wholesale Price Index (1947=100) .....	104.7	104.7	104.3
Stock Price Index of 11 Chemical Companies (Standard & Poor's Corp.) .....	486.1	445.4	331.7

#### MONTHLY

Foreign Trade (Million Dollars)	Exports			Imports		
	Latest Month	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
Chemicals, totals .....	\$91.8	\$86.7	\$85.4	\$18.5	\$17.6	\$15.5
Coal-tar products .....	6.2	5.7	6.0	3.5	3.7	2.1
Industrial chemicals .....	14.2	11.5	13.2	7.0	6.2	4.6

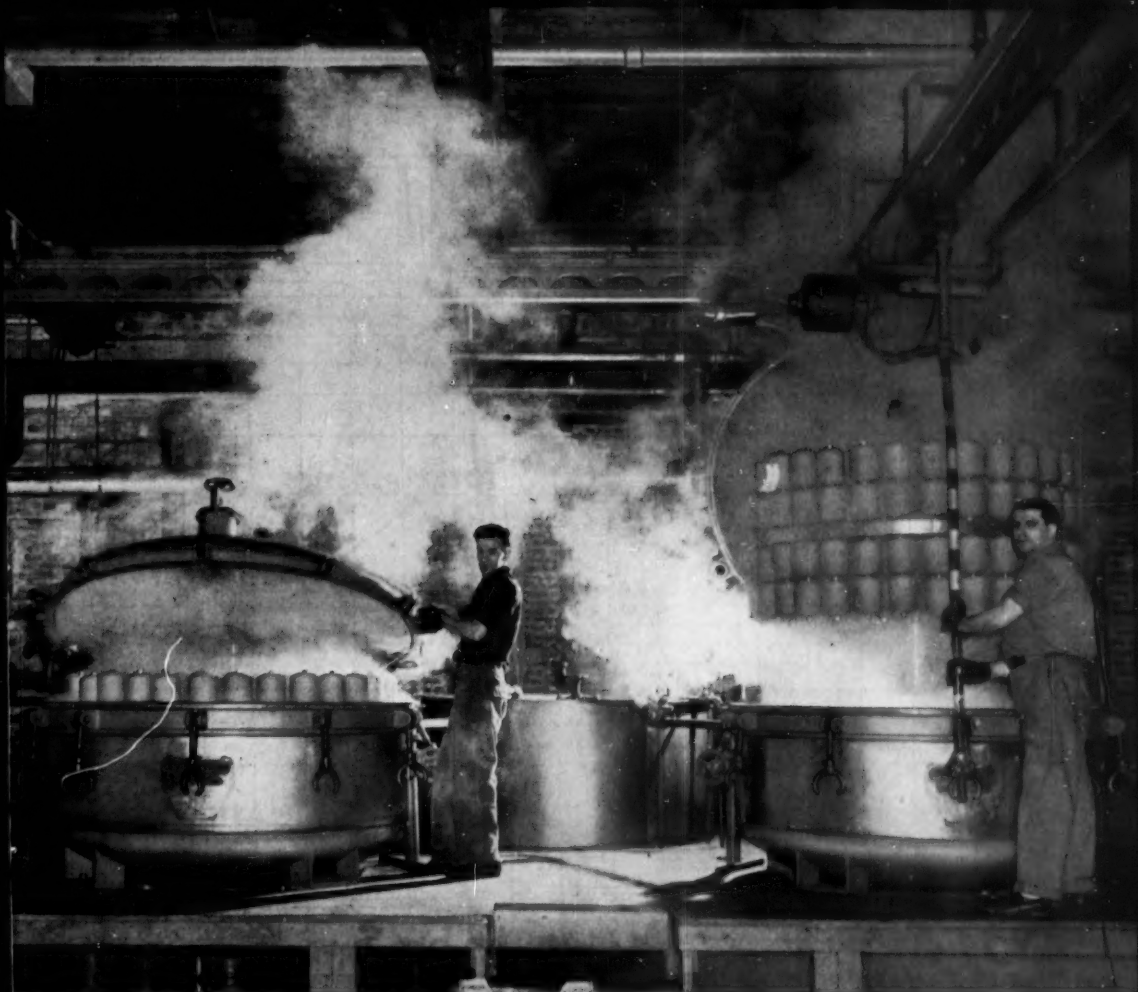


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## INTERMEDIATES FOR DYESTUFFS: one of many uses for methylamines

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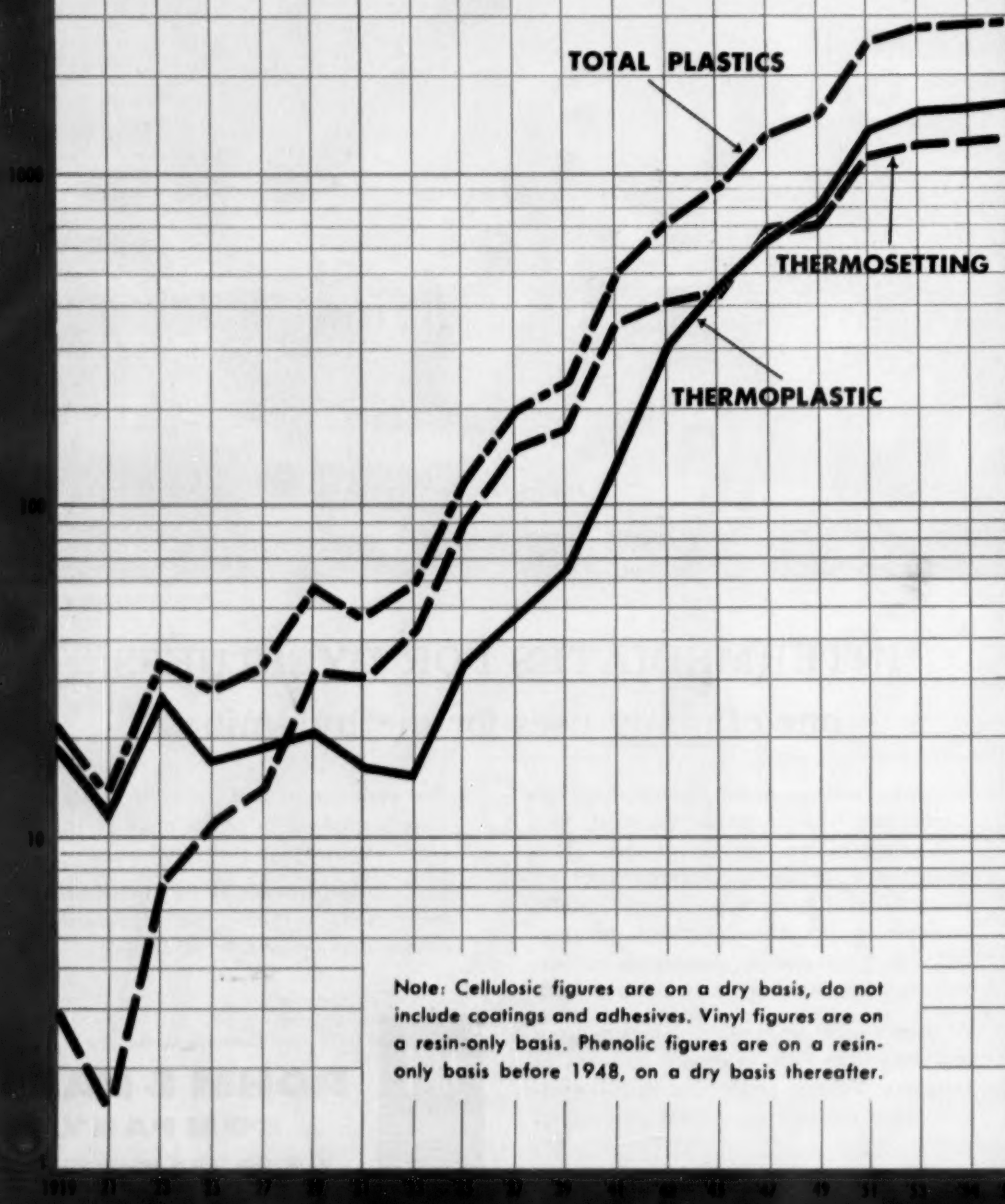
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# PLASTICS PRODUCTION

(MILLION LBS.)



Note: Cellulosic figures are on a dry basis, do not include coatings and adhesives. Vinyl figures are on a resin-only basis. Phenolic figures are on a resin-only basis before 1948, on a dry basis thereafter.

by Irving Skeist

## Plastics: Growing Five Times Faster than All Industry

Already a member of the select billion-dollar industries, plastics—yet to stop for their second wind—are pushing on to still higher peaks.

Rounding out the past decade with a 300% growth, plastics output promises to touch the 3-billion-lb. mark this year, leave it in the shadows next year.

Thermoplastics are leading the way with vinyls in the No. 1 slot. But positioning is far from rigid as plastics battle outsiders and play leapfrog among themselves. Here's a rundown on the players and the plays:

**More pushed than pushing,** plastics producers are looking forward to a record-breaking year-end accounting this year. Production, they believe, will top 3 billion lbs.—almost 10 times the 1940 figure; more than 100 times the 1925 total—and sales will keep pace.

From almost nothing just a half-century ago, plastics and resins have grown into a billion-dollar industry. Already the chemical end-group of highest value, it is expected to expand almost twice as fast as the entire chemical industry itself, five times as fast as U.S. industry as a whole.

**Something's Got to Give:** While plastics has created many of its own markets, much of its growth has been at the expense of other materials.

Already occupying greater cubic footage than aluminum, copper, and all the other nonferrous metals together, plastics promise to displace even more materials in the future.

In the competition among the plastic materials themselves, the natural plastics—casein, shellac, cold-molded bitumens—are almost forgotten. The semisynthetic cellulose have attained stability without bright growth prospects.

And among the completely synthetic resins, the finicky older thermosets—phenolics and ureas—can't keep up with the adaptable new thermoplastics of the addition-polymer school.

The old competition between thermosets and thermoplastics has intensified in recent years. Behind in the '30s, the thermoplastics caught up during the war, and after running neck and neck for several years, are now far in the lead. Potentially cheaper, easier to process, and possessing a broader range of color possibilities, the thermoplastics look forward to widening markets. But the thermosets have little cause for gloom; they have the heat resistance and rigidity demanded in many growing electronics and transportation applications.

**Growth Dollars:** Investment in new plastics capacity, a sign of industry's confidence, is everywhere evident. Polyethylene has attracted the largest number of new companies and the greatest dollar expansion. At the beginning of last year there were only two producers, Bakelite and Du Pont. By next year's end at least a dozen

companies will be in pilot-plant or full-scale production. Much of the furor centers around the new semirigid, "low-pressure" polyethylenes produced by the Ziegler and Phillips processes. It is expected that these materials will eventually take much business away from both vinyls and polystyrene, as well as from nonplastic materials. Here is how the others stand in their race for expansion dollars:

- In vinyl chloride, expansion is taking place despite an apparent surplus of production capacity. Several users of vinyl resins, manufacturers of film or wire, will make their own polymer instead of buying it from the nine present resin suppliers. In addition, the synthesis of vinyl chloride monomer is wooing alkali manufacturers whose cup of hydrochloric acid is running over. We may expect to see Allied and others follow the lead of Diamond Alkali and Dow.

- In nylon, Allied is pushing Du Pont; the inevitable price reductions could widen markets sufficiently to

bring Chemstrand and American Enka, both entering the nylon fiber field, into nylon plastics.

- Unsaturated polyesters can be made by anyone with a resin kettle, and at last count more than 40 companies had joined the free-for-all. While markets for these resins are developing satisfactorily, price competition will probably leave the bulk of the business to the companies with the strongest raw material positions.

- Polyurethanes and other isocyanate resins seem to be repeating the phrenetic course of the polyesters. There is much activity by many companies but no substantial production yet.

- In the epoxy resins, a price squeeze will make it more difficult for pioneering Devoe & Reynolds and Ciba to compete with Shell and Bakelite, which have their own epichlorhydrin and bisphenol. Dow also makes the two major components, could easily enter this promising field.

- Polystyrene itself is quiescent. But there is considerable activity in rubber-modified styrenes and copolymers; and Cyanamid, Dow and Hercules are developing three different methyl styrene monomers with promising potentialities.

**Integrated for Effect:** Every one of these "growth" resins has been reduced in price during the past few years—in some instances to initiate

neophytes; in others to ward off outsiders. But, industry leaders maintain, the more usual objective is to encourage new end-uses and increase demand.

With monomeric vinyl chloride and styrene produced at a cost of 10-12¢, and ethylene still cheaper though more costly to polymerize, polymer prices, of course, can come down still further. To wit: some plastics men envisage a 25¢ figure for polyethylene.

An inevitable result of the drive toward lower costs is integration. Today, few manufacturers can afford to limit themselves to making resins. Most plastics manufacturers are also basic in petrochemicals, coal-tar derivatives, chlorine or ammonia. Moreover, they market several types of plastics materials—thus benefiting from economies in merchandising and distribution—and sell almost their entire plastics output to smaller companies who do the molding, extruding, calendaring, fabricating.

Until its recent merger with Hooker, profit-making Durez was one of the few sizable companies devoted exclusively to plastic materials.

Processing by the materials producer, once commonplace, now persists in only two materials: phenolics and vinyls. General Electric and other electrical companies make the phenolic resin they need for their molding and laminating operations. Goodrich and several other rubber companies are



## Meet the Author

IRVING SKEIST, polymer consultant and commentator, made his debut in *CHEMICAL WEEK* with a well-received report on plasticizers (*CW*, April 16, p. 40), marks his return with this long-in-gathering report on plastics.

Meanwhile, between issues, in addition to compiling material for his current opus, Skeist found time to outline a book on the interplay of economic and technological forces in the plastics industry and to open up Skeist Laboratories in Newark, N.J., as an appurtenance to his consulting.

His primary interest, of course, is still economic and research consultation in the polymer field.

And now that his current *CW* assignment is completed, says Skeist, he plans to switch roles from commentator to doer, devote most of his newly regained time to his laboratory and his business.

successfully translating their synthetic rubber experience to vinyls; and, experienced in foamed latex, they will probably lead in the development of vinyl and polyurethane foams.

At the same time, the ranks of vertically integrated vinyl polymerizer-processors are growing, will soon be augmented by Ross & Roberts, Rubber Corp. of America, Pantasote—all film calenderers—and Apex, a compounder supplying wire-coaters.

## Thermoplastics

While some manufacturers are vying for a foothold in the plastics field, and others are trying to expand, the plastics themselves are fighting for position, battling newcomers, and playing leapfrog among themselves. At present, the thermoplastics as a group are in the lead and the vinyls reign unchallenged as the No. 1 plastics. In more detail, here is how the over-all pattern breaks down for the present, how the individual plastics shape up for the future:

### VINYLS

The vinyls are far out front in the plastics race, and it will be many years before polyethylene, moving up through the pack, overtakes them.

Versatility is the key to the vinyl's success. They span the plastics spectrum, from rigid PVC pipe and saran filaments to flexible butyral for safety glass sandwiches and PVC plastisol squeeze toys. For economy on a volume basis, they can be filled with chalk or clay at 2¢/lb., or blown into foams that are more than 90% air. Processors of all sizes can utilize the vinyls: manufacturers of upholstery and shower curtains with million-dollar calender-banbury installations; coaters of wire or cloth with \$100,000 investments; plastisol molders and electronic heat-sealers with \$10,000 facilities.

Based on resin content rather than on total solids, the government figure of more than 0.5 billion lbs. of vinyls tells only part of the story. Eighty percent of vinyl resins are vinyl chlorides, usually compounded with plasticizers, stabilizers, and often fillers, lubricants and pigments. These added ingredients in some formulations exceed the resin content itself, constitute good-size markets in themselves (CW, April 16, p. 40).

**Vinyl Comeback:** Sleazy material offered by some processors during the postwar shortage years badly hurt vinyl's major (25%) market—film. But industry is wooing back the public with higher standards and a seal of acceptance. Increasing outlets for vinyl chloride resins are seen in flooring, wire coating, and fabric coating.

Vinyl-coated fabrics for automobile and living room upholstery are becoming more popular, replacing leather or uncoated cloth. Heavy-gauge vinyl is battling leather for handbags and luggage. Waterproof blends of vinyl chloride resins and butadiene-acrylonitrile rubbers are digging into the sole and heel market, while thin coats of vinyl lacquer protect shoe leather from the elements.

In wire coating, vinyls offer better electrical properties, heat resistance, a wider color range, and smaller cross-section than rubber or cloth. This last is particularly important in the rewiring of old buildings to take the increased load of air conditioning and appliances.

Rigid PVC pipe, still in its infancy on this side of the Atlantic, has suffered from inferior impact strength. But Goodrich has developed a resin that's said to have high impact strength and good processing characteristics without sacrificing rigidity. Free from plasticizer, the pipe is resistant to the action of chemicals, water, brine.

Of the nonchloride vinyls, vinyl acetate polymers are the most important. The latices have replaced starch and dextrans for many textile and adhesive applications, and are now capturing large territories in the paint market. A huge expansion in acetate consumption is anticipated, and several producers are enlarging their facilities. Among the leaders: Air Reduction, Bakelite, Borden, Celanese, Dewey and Almy, Du Pont, Monsanto, National Adhesives and Shawinigan.

Vinyl acetate is the most-used second monomer in vinyl chloride copolymers, principally because it is the cheapest ingredient that will give the desired improvement in solubility and processing characteristics. The acrylate esters have been coming down in price, but not enough to be a threat.

Polyvinyl acetate in bead form is an intermediate in the manufacture of polyvinyl alcohol for adhesives and polyvinyl butyral for safety glass. The butyral, plasticized with aliphatic

ether-esters, is the survivor of an elimination contest with cellulose nitrate, cellulose acetate, and the acrylics. There is no challenger in sight for the lucrative but exacting automotive business.

In vinyl markets dependent on chemical- and heat-resistance, the sarans are making headway, are proving better than PVC.\* Made by copolymerizing vinylidene chloride with minor amounts of vinyl chloride or acrylonitrile, they give filaments, films and moldings whose physical properties justify their higher cost for pipe, film, tape, upholstery, other applications.

**Set Up to Sell:** European manufacturers, selling only vinyl emulsion polymers, failed to make much headway here despite price differentials of several cents a pound until recently when Italian and other producers offered American-style suspension polymers. These met with response that forced American PVC makers to drop prices 7¢/lb. last spring.

Bakelite and Goodrich, the first and leading vinyl chloride polymerizers, are typical of the two types of producers that dominate the industry: companies with diversified plastics interests, including Monsanto and Dow, and rubber producers, including Naugatuck, Firestone, Goodyear and General Tire. Diamond Alkali became involved in vinyl chloride as Naugatuck's monomer supplier, decided to continue through the polymerization step. Allied Chemical may travel a similar route.

While the margin between monomer and polymer is alluring, it is by no means a guarantee of success. Glenn L. Martin, seeking to diversify after the war, lost several millions in a costly vinyl development before relinquishing its operation to Naugatuck. Chemical know-how comes high.

### POLYSTYRENE

**Polystyrene is the top-selling molding powder.** It is brittle compared with the cellulose that it has displaced, cannot be compounded like the vinyls, ages earlier than the acrylics, is more readily attacked by solvents than polyethylene, and has

\* This hasn't discouraged new producers from entering the field. Latest is Escambia Bay Chemical Corp. A well-financed new venture organized jointly by United Gas, Electric Bond and Share, and National Research Corp., Escambia is building a \$25-million plant on the Florida Gulf near Pensacola for the manufacture of PVC as well as fertilizers and other chemicals.

poorer heat resistance than the thermosets and many thermoplastics.

The one overriding reason for its success is low cost. It is a lightweight hydrocarbon, prepared in relatively few steps from cheap raw materials, and readily injection-molded in short cycles.

Only six companies have the multi-million-dollar facilities required to produce the monomer. Dow, Monsanto, Carbide and Koppers are the major producers of both monomer and polymer. Foster-Grant, an injection molder boldly integrating back to the beginning, sells its surplus resin via Muehlstein. Shell, the newest styrene maker by virtue of its recent acquisition of an RFC synthetic rubber facility, could become another polystyrene producer.

**Mothered by Dissatisfaction:** Consumer dissatisfaction with regular polystyrene, which has a tendency to fracture, exposing sharp cutting edges, has spurred producers to develop impact styrenes as alternate products. Generally alloys of polystyrene with GR-S or GR-N rubbers, these modified styrenes command premium prices. The butadiene-styrene rubber blend has become particularly popular for extrusion into sheet and subsequent vacuum forming into refrigerator door panels, trays, freezer covers, etc. But the natural high-impact styrene is still opalescent and tends to become brittle with age. A crystal-clear, heat-stable, light-stable impact styrene would enjoy a large new market—if the price were right.

Instead of blending polystyrene with other polymers, the styrene monomer can be copolymerized with other monomers. Virtually every conceivable comonomer has been tried, but only a few show commercial promise. The acrylonitrile copolymer is one of these. Transparent but slightly tinted, the styrene acrylonitrile copolymers have heat distortion temperatures high enough to stand up in boiling water, together with improved chemical

resistance. Produced in specialty quantities, they are still too high-priced for general acceptance.

But a steadily declining price for acrylonitrile monomer should help bring these copolymers close to the price range of polystyrene.

Styrene-butadiene emulsion polymers containing 50-75% styrene (unlike GR-S rubber, which is mostly butadiene) coalesce when the water is evaporated, forming tough films. Large quantities of these latices go into paints and coatings for paper and textiles but are facing a fight with polyvinyl acetate and possibly acrylics for these markets.

**Accent on Methyl:** American Cyanamid and Dow have recently announced vinyl toluenes (methyl styrene) with strikingly different properties. The Dow product, made by Friedel-Crafts condensation of ethylene and toluene followed by dehydrogenation, is two-thirds meta isomer, has only a few percent ortho, and yields a polymer that softens at a lower temperature than polystyrene. It will find use principally with alkyds and unsaturated polyesters.

Cyanamid's methyl styrene, on the other hand, is derived from acetylene and toluene, contains 33% of the ortho isomer along with 65% para and 2% meta. The ortho content gives the polymer a heat-distortion temperature higher than polystyrene, and other properties are the same. This polymer will be competitive with polystyrene, price-wise. A methyl styrene-acrylonitrile copolymer will also be available at only a few cents/pound premium, utilizing two monomers controlled by Cyanamid.

**Hercules'** alpha-methyl styrene, substituted in the side chain rather than the ring, can be copolymerized in small percentages with styrene for improved heat resistance. (Dow Styron 700 is another such copolymer.) All three methyl styrenes will bear watching for their effect on styrene consumption.

**Italian Entry:** The most exciting styrene news comes from Milan, where Professor Natta has prepared "isotactical" styrene polymers—crystalline polymers containing long sequences of similar steric configuration. Using metal-organic catalysts similar to those in Ziegler semirigid polyethylene, Professor Natta becomes the first to produce crystalline polystyrene and

polypropylene. Still in the laboratory stage, this high-melting material could have tremendous commercial significance if it can be plasticized to produce the long-sought cheap, tough, transparent polystyrene.

#### OTHER CYCLIC RESINS

**Wood, coal and oil**, fighting for markets on a large scale, have their smaller battles, too. One of the fiercest is the fight between the low-molecular-weight resins from terpenes, coumarone-indene, and cyclopentadiene. At present, petroleum-derived cyclopentadiene is winning.

The resins, used chiefly as components of asphalt tile and varnishes, provide resistance to water and alkalis. They are also used in chewing gum, rubber compositions, phonograph records, electrical insulation, and sealing and waterproofing materials. Production has been increasing steadily, seems likely to continue upward.

Barrett, Kenrich, Neville, Pan American, Pennsylvania Industrial Chemical, and Velsicol are volume producers. Price varies with color and other properties, averages 9¢/lb.

#### POLYETHYLENE

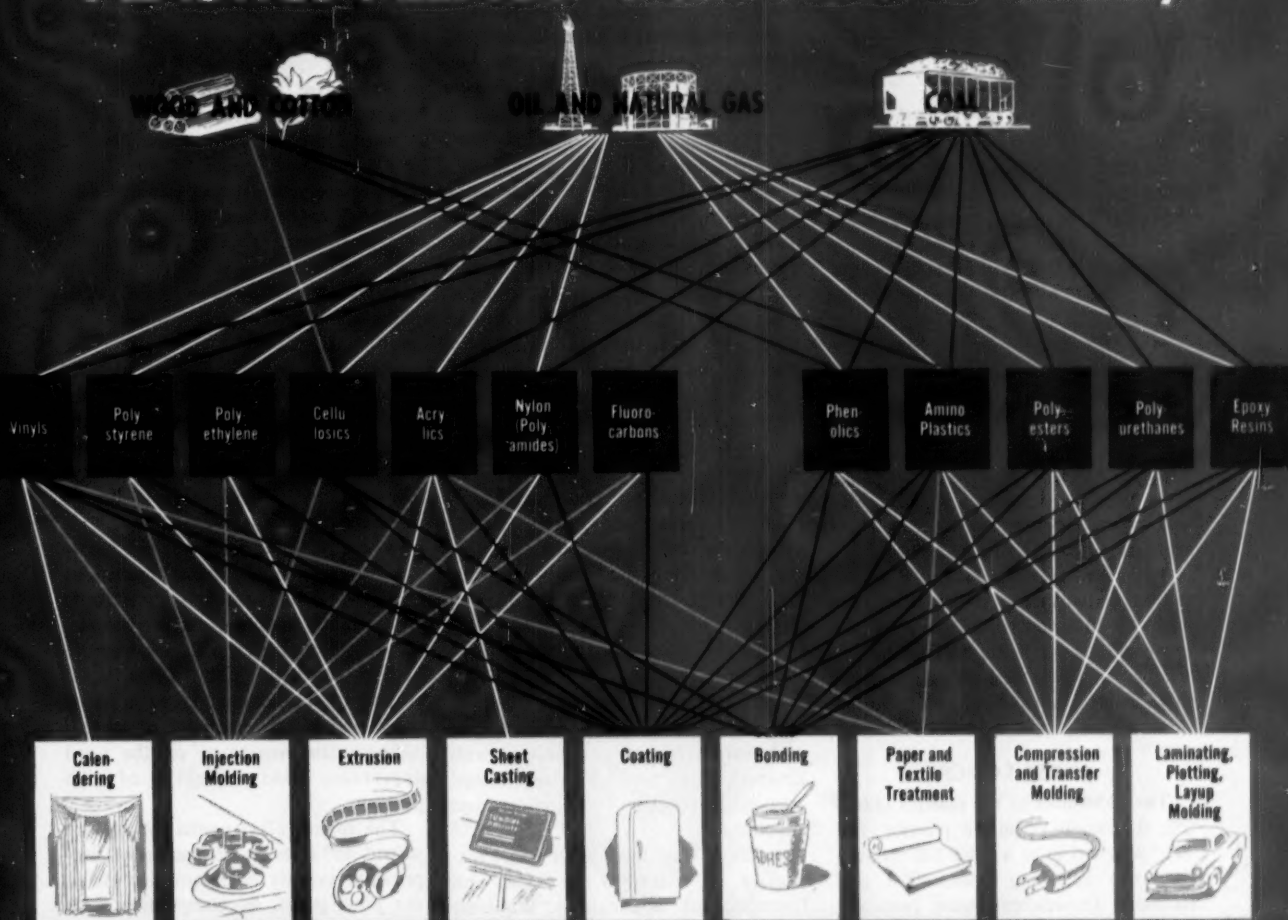
**The rise of polyethylene** is phenomenal. Last year's production topped '53 by 50%, may show a similar gain this year. Two years ago, Bakelite and Du Pont were the sole producers of the plastics grades; now a dozen firms have reached at least the planning stage, and most of them are already in production.

Polyethylene film has grown with the supermarket. Vegetables packaged in poly outsell bulk produce, despite nickel markups. The flexibility of heavy-walled polyethylene containers has been so well publicized that polyethylene is widely known as "the squeeze bottle plastic" and sales are booming.

Extremely low in power factor, it has replaced gutta percha in transatlantic cable. Polyethylene pipe, light and easily coiled, finds increasing use for the transportation of cold water. Molded toys and housewares are truly unbreakable. Paper-poly laminates combine strength with water resistance. And the low-molecular varieties are blended with wax to improve the gloss of bread wrappers.

Made from the simplest monomer of all, polyethylene is now available in several varieties:

# PLASTICS PLEXUS—from Field to Infinity



• In conventional polyethylene, the commercial polymer has a long polymethylene trunk, with branches at intervals of perhaps 30 methylene units. These branches interfere with crystallization, make the polymer soft and low-melting.

• The new, stiffer polyethylene, developed in Germany by Professor Karl Ziegler (*CW*, July 9, p. 48), makes use of complex metal organic catalysts, which usher the ethylene monomer into place to produce a polymer without side chains. The linear molecules crystallize to a much greater extent than is possible with conventional branched polyethylene. The new poly-

ethylene is semirigid instead of flexible, resists abrasion, is not attacked by solvents; the surface is glossier, tensile strength is twice as great, and the softening temperature is well above the boiling point of water rather than slightly below it. This last property is particularly significant since it enables steam sterilization in such applications as baby nursing bottles. Soft drink bottles, automobile steering wheels, pipe to withstand higher bursting pressures, gears and bushings, and wire coatings are other projected outlets.

Capital investment should be reduced because polymerization pressures will be low—500 psi. or less.

But there will be additional expense in freeing the polymer from discoloring traces of catalyst; consequently low-pressure poly is expected to sell at slightly higher prices than the older material, at first. Eventually, both types should become sufficiently cheaper to take markets away from vinyls and polystyrene.

Independently, Phillips Chemical Co. has developed a new process of making a semirigid polyethylene (Marlex 50). Presumably, the Phillips' process makes use of a chrome oxide catalyst on a silica alumina support (*CW*, May 14, p. 101). The company is now building a plant at Pasadena,

Tex., expects to turn out 110 million lbs./year of various Marlex resins after the plant goes onstream sometime in the second quarter of 1956.

- Du Pont has been exploring ethylene copolymers for many years, is expected to offer new materials soon.

- Irradiation of conventional polyethylene by gamma rays, developed by General Electric, produces a cross-linked material with far greater heat resistance than even the Ziegler or Phillips types. The process is expensive, will be restricted to electronic and other specialty uses for a heat-resistant, low-loss dielectric.

- Where greater flexibility is required, polyethylene is being blended with 10-20% polyisobutylene. Good low-temperature flexibility, ozone resistance, and electrical properties make this material a valuable cable insulation.

## CELLULOSICS

The old-timers of the plastics industry, the tough cellulosic plastics, last year weighed in at a solid 121 million lbs., not including photo film and lacquers. Transparent boxes, pens and pencils, dolls, pastel-colored telephone bases, automobile parts, toilet seats, housings for appliances and spectacle frames are articles in which the impact strength of cellulotics is appreciated, and put to use.

At the same time, except for a few markets such as spectacle frames, mother-of-pearl toilet seats, knife handles, and dimensionally stable drawing instruments, cellulose nitrate has been superseded by safer, easier-fabricated materials. The celluloid harness ring has given way to the butyrate steering wheel. The photo film market, 25 million lbs., has switched completely to acetate and butyrate safety film. And the celluloid kewpie doll, inarticulate and unarticulated, has grown up to become a walkie-talkie glamor girl with resilient acetate body, skin-soft vinyl plastisol face, butyrate

eyes, stiff nylon lashes, and curable saran hair.

**Acetate Update:** Cellulose acetate flake, compounded with plasticizers, is the principal cellulosic plastic material. Celanese, Eastman and Hercules have integrated flake and molding powder operations. Eastman and Ansco are still the major cellulose ester photo film producers (not shown in government plastics statistics, their output is estimated at 25 million lbs./year). Du Pont and Bakelite have withdrawn from low-margin acetate plastics; replacing them, smaller companies are finding a niche in special color effects, such as pearls and tinsels, as well as the reprocessing of trimmings from sheet fabricating operations. As for the other cellulotics:

- In Eastman's cellulose acetate-butyrate, part of the acetate groups are replaced by bulkier, less-polar butyrate groups, resulting in a softer polymer requiring less plasticizer. Higher in price, the mixed ester is valued for its dimensional stability, and is enjoying increasing sales for such end uses as light-colored telephone bases, automobile steering wheels, vacuum-formed signs, pipe for disposal of salt water in oil fields.

- Celanese is going into full-scale commercial production of cellulose propionate. Priced to compete with Eastman's butyrate, Forticel should get a good reception from molders and vacuum-formers.

- Ethyl Cellulose, even more expensive, is marketed by Dow and Hercules for applications requiring very low power factor (proximity fuses, radar housings), toughness plus moisture resistance (flashlights, tool handles), low softening temperature (strippable hot-melt coatings). Sales are fairly static at a low level, may suffer from the introduction of propionate.

## ACRYLICS\*

The acrylics are the optical plastics. Transmitting more than 90% of visible light, acrylic sheets and molding powders are used for cockpits and noses of military aircraft, domed skylights, large advertising signs, automobile taillights and medallions, refrigerator nameplates, watch crystals, brush backs, juke box panels.

\* Not to be confused with acrylic fibers, which are based on acrylonitrile rather than on acrylic and methacrylic esters.

Methyl methacrylate is the principal starting material for both acrylic sheets and molding powder. Currently, cast sheet leads in volume, but molding powder is gaining. Du Pont has relinquished the cast sheet field largely to Rohm & Haas; both companies make the molding material.

**Price Not Paramount:** In the cast sheet process, polymerization is conducted between glass plates. This expensive process, necessary for strain-free optical clarity, restricts the sheet material to end-uses that can afford the high cost. Molding powder, prepared by suspension polymerization, is somewhat cheaper but still twice the price of polystyrene, and considerably heavier.

Extruded acrylic sheet, introduced as an economical replacement for the cast variety, has not overcome the handicaps of inferior surface and "memory" (which causes excessive shrinkage when the sheet is heated for forming).

The price of acrylics was cut 5¢/lb. this spring. While further reductions are possible, it is unlikely they would appreciably increase sales volume. The acrylic plastics will still have to get by on their looks. Price is of secondary importance; usage is based on the excellent reactivity of methyl methacrylate monomer, on the good appearance and stability of the polymer.

The higher alkyl methacrylates are valued additives to lubricating oil, improving viscosity index and depressing the pour point. In competition with polyisobutylene and other additives, they are holding their own.

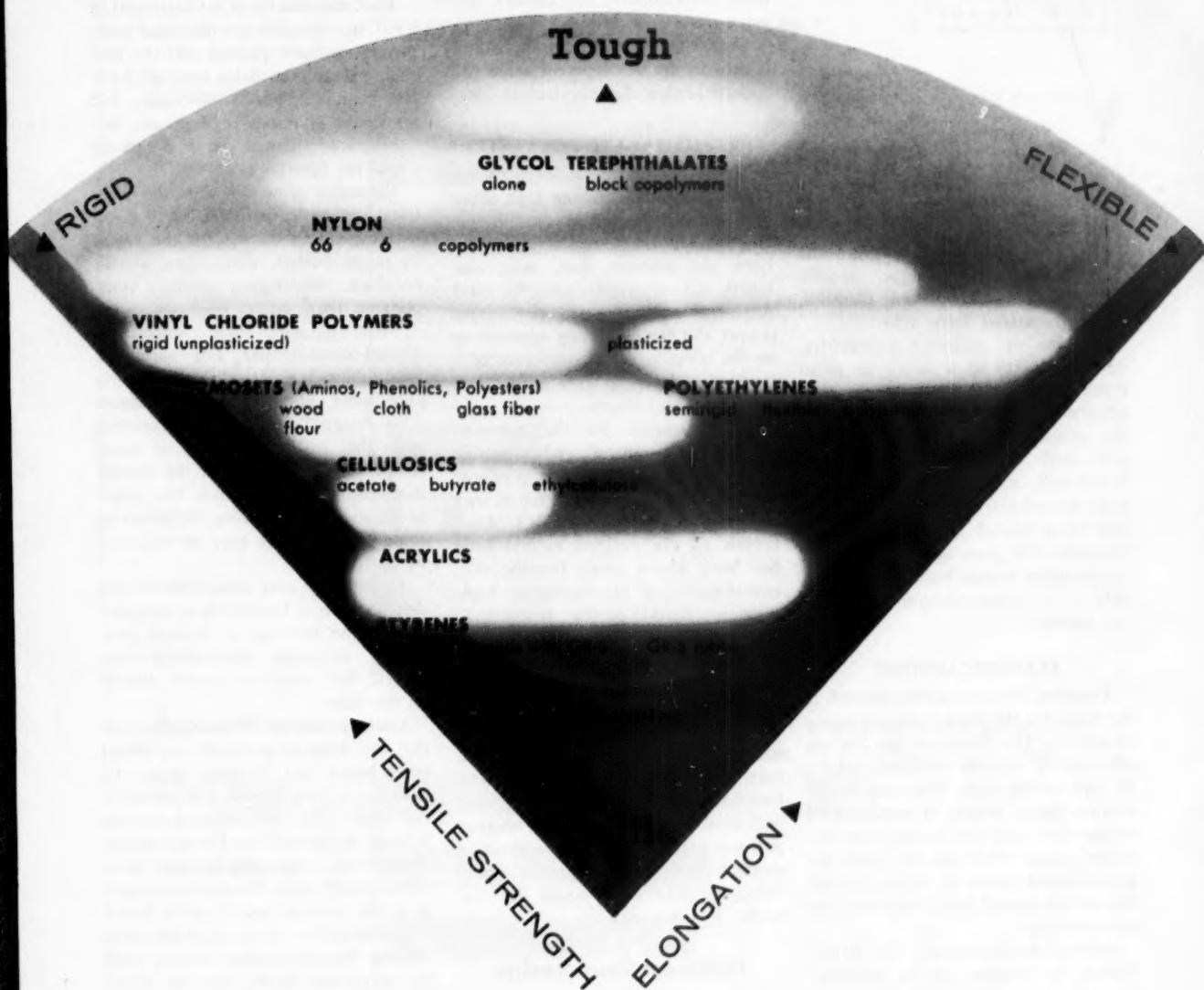
Acrylate polymer emulsions, long popular as leather and textile finishes, are being promoted as bases for latex paints, in competition with styrene-butadiene and vinyl acetate polymers. Here, price will definitely enter the picture; it appears that Rohm & Haas is prepared to fight for this mass market.

## NYLONS, OTHER POLYAMIDES

Nylon, originally a Du Pont trademark, has become as generic as celluloid and cellophane. Durable, tough and resistant, it functions effectively as the noiseless gears of linotype machines, washing machine bearings that need no oil, stuffing tubes to protect electrical cables on aircraft carriers from salt spray.

# PLASTICS PANORAMA

## Toughness Is Always Desirable



Big news in nylon is the contest between "66" and "6." (The "66" is the polyamide made by condensing hexamethylene diamine with adipic acid, while "6" is the polyamide from caprolactam.) Carothers and his co-workers, inventors of the nylons, selected "66" for commercial exploitation by Du Pont; in Germany, "6" got the nod.

More recently, Allied invested heavily in the caprolactam, hopes to establish itself in the small but lucrative plastics market as well as in fibers. Allied expects no easy victory, is prepared for a long struggle. Meanwhile, two other newcomers to the nylon fiber field, Chemstrand ("66")

and American Enka ("6"), are watching the plastics battle with interest.

**Finicky but Tough:** An expensive thoroughbred, nylon is also difficult to handle. The popular "66" molding powder, Zytel 101, must be heated to a high temperature, then abruptly melts to a fluid of low viscosity. The "6," plasticized by the 10% of monomer that is present in equilibrium with the polymer, melts at a lower temperature and over a broader temperature range. These qualities, possibly undesirable in textiles, may endear "6" to the plastics molder. (A more rigid caprolactam polymer is obtained by extracting the monomer with hot water.)

The extreme toughness of both "66" and "6" nylons is the result of a happy combination of strength and stretch—strength from the highly polar amide groups, stretch from the intervening hexamethylene groups. Other nylons, with lower proportions of amide groups, are not as strong, but are easier to extrude or dissolve, and more resistant to moisture.

Several of these are already or potentially important: Du Pont's Zytel 31, a "610" nylon from hexamethylene diamine and sebacic acid instead of adipic; Belding-Corticelli's "B.C.I. Nylon," an alkoxy-substituted "66," which can be cross-linked; Rilsan Corp.'s "11," imported from

France, the polymer of an amino acid derived from castor oil. In contrast with these expensive nylons are the General Mills polyamides, derived from ethylene diamine and plentiful, cheap dimerized fatty acids.

Proteins are nature's polyamides, each made up of a dozen or more types of amino acid following each other with fantastic regularity. Casein, the protein plastic extracted from skim milk with rennet, clings to a 5-million-lb. market in buttons. Sensitivity to moisture and high production cost have forced it to yield to the synthetics for most applications, and its remaining button business is threatened by urea-formaldehyde and cellulose acetate.

#### FLUOROCARBONS

**Fluorine, the most active element**, is the basis for the most inert and stable of plastics. The fluorocarbons are unaffected by organic solvents, alkalis or even strong acids. They are low in electric losses, usable at extremes of temperature and are flexible over the entire range. They are the most expensive-loaded resins to climb beyond the million-pound level, and they are still climbing.

Polytetrafluoroethylene, Du Pont's Teflon, in addition to its chemical inertness, has an unusually low coefficient of friction, which makes it suitable as a bearing material. Its useful temperature range is tremendous—from near absolute zero to 550 F (but toxic fluorine-containing gases are evolved above 400 F). In suspension, it is used as coatings and impregnants.

Polymonochlorotrifluoroethylene, introduced by Kellogg as Kel-F, is now made by Bakelite and Acme Resin also. The chlorine atom, bigger and more polarizable than fluorine, modifies the polymer considerably, making it easier to process, somewhat less stable, more readily attached to other materials, and slightly diminished in operating range: -330 F to

390 F. At present, electronic applications, both military and civilian, consume most of the resin.

Somewhat afield, Minnesota Mining is now in the development stage with potential-laden fluoracrylate resins.

#### TEREPHTHALATE POLYESTERS

**The glycol terephthalates** (Terylene, Mylar, Dacron) combine high tenacity with high elongation to produce the toughest of all fibers and films. Even the thinnest film, only one-fourth mil, cannot be torn by hand. Although costing several dollars per pound, the film is finding applications in the electrical industry and as a laminating layer to give strength to other films and sheets.

Raw materials for the polyester are ethylene glycol and dimethyl terephthalate; the latter is produced from *p*-xylene by Du Pont for its own use, and by Hercules for ICI. Alcoholysis of the purified methyl ester has been found more feasible than esterification of the insoluble, high-melting, hard-to-purify terephthalic acid.

The ester groups must be para to each other to achieve the high degree of crystallinity that is responsible for the material's unique properties. But recent work shows that a molecule may have sequences of the precious terephthalate polyester interspersed with even longer sequences of cheaper polymer building units, and still retain most of its valuable properties. These "block copolymers" could be the wedge to lower prices.

#### Thermosetting Resins

**Unlike the more glamorous** thermoplastics, the thermosets are the workhorses of the plastics industry. They function widely, but for the most part unrecognized, in such uses as switch parts, glues for plywood, and impregnants giving wet strength to papers, crease resistance to cottons.

The outstanding characteristic—and asset—of the thermosetting resins is their heat resistance. It is indispensable to their use in motors, appliance handles, table tops, dishes, friction faces, grinding wheels, and the like. At present, they are running second to the thermoplastics in sales; but, if anything, this positioning is far from firm. Individually, here is how thermosets stand:

#### PHENOLICS

**First manufactured** by Bakeland in 1907, the phenolics are the oldest completely synthetic plastics and the top-selling thermoset. Sales were off 15% last year, rebounded this year, will no doubt continue to fluctuate; but experienced hands are optimistic about the future.

Phenolics grew up with the electrical industry which still offers a top and expanding market for the resins in plugs, outlets, connectors, circuit breakers, switchgear, motor components, etc.

Most phenolics are unmodified phenol-formaldehyde. For varnishes, oil-solubility is achieved through alkyl-substituted phenols or modification with resin. To obtain a laminating resin that will cure rapidly at room temperature, a portion of the phenol is substituted by resorcinol. For greater plasticity in molding compounds, some formaldehyde may be replaced by furfural.

Despite high cost, resorcinol-formaldehyde resin is increasing in popularity for the bonding of aircraft propellers at room temperature and neutral pH, avoiding caustic attack on the wood.

**Looking ahead:** Two applications that are developing slowly are structural board and foundry resins. In both cases, resin content will generally run under 10%; but potential volume is large. Structural board would utilize cheap wood waste impregnated most economically (with thinnest coverage) in a wet process, and possibly faced with decorative sheets of high resin content. Foundry resins, binding sand for cores and shells, may be either phenolics or ureas, but castings from phenolic shell molds are smoother, cleaner, and are held to closer tolerances than ever before.

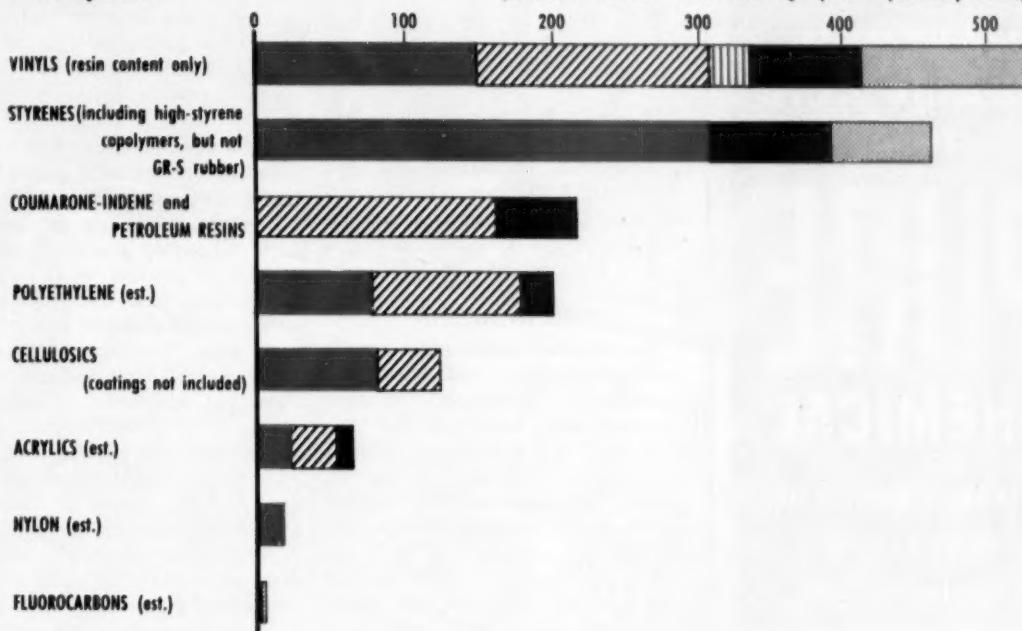
Phenolics are also employed as bonding agents in abrasive wheels, clutch facings, brake linings and glass-wool insulation. They compete with rubber for the friction facings, but are combined with synthetic rubbers to produce new molding compounds, tougher than phenolics alone and harder than rubber.

Microballoons, hollow spheres 50 microns in diameter, are being used as floating covers on oil and gasoline tanks to hold down evaporation, are gaining popularity as a phenolic outlet. Bonded with additional resin, they

## WHERE PLASTICS GO

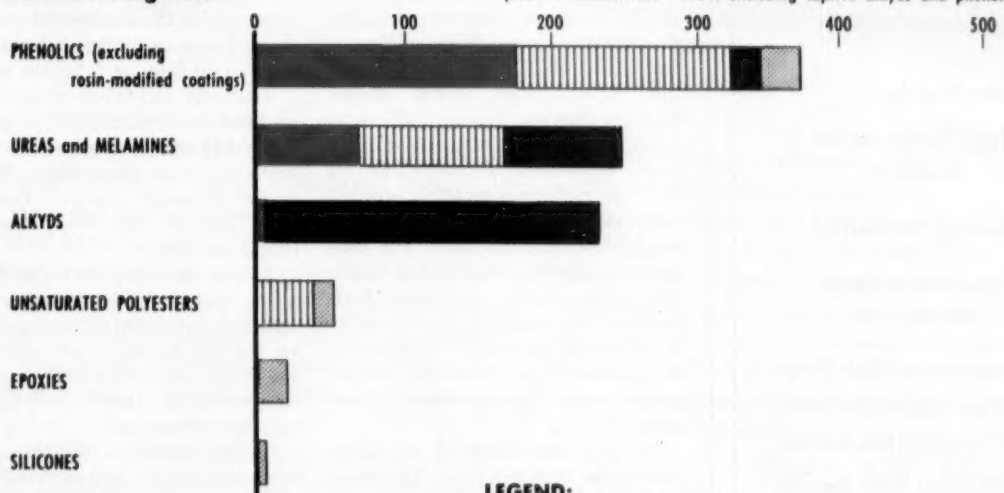
### Thermoplastics

(sales in million lbs. — 1954: excluding captive alkyds and phenolics)

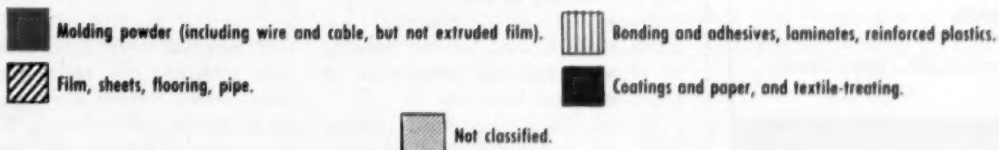


### Thermosetting resins

(sales in million lbs. — 1954: excluding captive alkyds and phenolics)



#### LEGEND:



Note: Vinyl figures are on a resin-only basis. All other figures are on a dry basis, include plasticizers, fillers, et. al. Figures for fibers, rubbers, and cellulosic coatings and adhesives are not included.

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## C W Report

form syntactic foams with high strength-to-weight ratio.

Among the leading phenolic resin producers, Bakelite is biggest, overall, while Durez concentrates on molding powder and GE has the largest captive molding operation.

### AMINO RESINS

The important amino resins are the urea-formaldehyde and melamine-formaldehyde condensates. The ureas are older, dating back to the late '20s, when they were hopelessly introduced as unfilled, transparent "organic glasses." Brittleness on aging doomed the transparent material. Strengthened by cellulose fibers, however, urea molding powders have taken hold in colorful, heat-resistant buttons, lighting fixtures, TV cabinets, clock cases and closures.

The newer melamines are superior to the ureas in resistance to heat, moisture and arcing. These advantages are paying off. Despite much higher cost, the melamines already account for more than one-fourth of all amino resins, and are gaining steadily. A single application, dishware, utilizes 80% of melamine molding powder, and is expected to double present consumption within five years. The melamine is colorful, tougher and lighter than china, harder and more heat-resistant than other plastics. Its ability to withstand automatic dishwashing is appreciated by housewife, restaurateur and Quartermaster Corps alike.

But only one-fourth of all amino resins goes into moldings. The treating and coating of textiles and paper consume an equal quantity, and much more is used for the bonding of plywood and the preparation of paper and glass laminates.

Finally, alcohol-modified amino resins are combined with alkyd resins to produce durable, hard, light-colored finishes on refrigerators, washing machines and kitchen cabinets. Overall, the outlook is optimistic.

### POLYESTERS AND ALKYDS

The reinforced polyesters are the most glamorized of the structural materials. Nevertheless, their beauty was long quiescent, and only recently awakened. From 6 million lbs./year during World War II, they slipped back to 1 million in 1947, then reversed themselves, last year reached 36 million lbs., are currently climbing fast.

Reinforced polyesters can be fashioned into complicated shapes at low capital investment. With the simplest equipment, labor cost per piece is high; but tooling is so cheap that it is feasible to produce small quantities. Car bodies, milk truck tanks, pipe several feet in diameter, aircraft wings and tails, translucent corrugated building panels, sinks and tubs, shower stalls and contour-fitting chairs are among the items testifying to the polyesters' flexibility. Fishing rods, helmets, luggage, radomes and tote boxes give further evidence of their versatility and toughness.

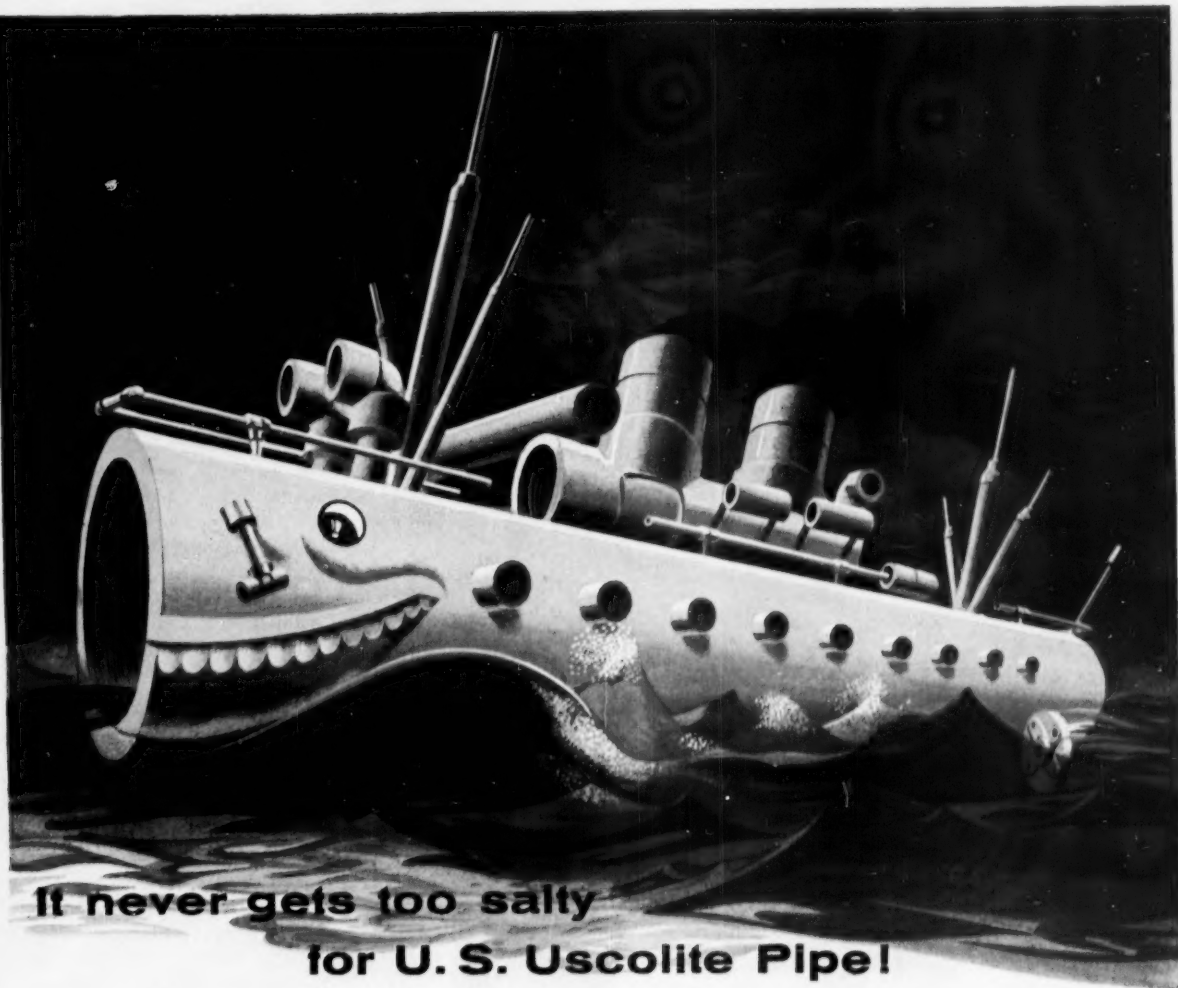
**Modified for Effect:** The resins for these reinforced plastics are generally unsaturated polyesters such as propylene glycol maleate, cured in the final stage with a highly reactive monomer such as styrene, which copolymerizes with some of the unsaturated groups in the polyester to convert it from a viscous liquid into an infusible solid.

Reactivity and other properties are modified by replacing all or part of the maleic anhydride with other anhydrides or acids; for example, itaconic (more reactive), phthalic (nonreactive), azelaic (flexible), chlorendic (flame resistant).

Among the other unsaturated polyesters, the polyallyl esters, diallyl phthalate and diallyl diglycol carbonate are the best known. Triallyl cyanurate and diallyl carbate are slowly achieving recognition for their contribution to high heat resistance.

Closely related to the unsaturated polyesters are the alkyds, usually the polyesters of phthalic or maleic anhydride and glycerol or pentaerythritol, modified by drying or nondrying fatty acids and oils, rosin, phenolics, amino resins, styrene, etc. The alkyds are by far the predominant resins used in coatings—0.5 billion lbs./year.

A small amount of alkyds goes into molding powders, curing very rapidly to produce electronic components with high arc resistance. Brittleness con-



Controlling highly corrosive brine is a major problem for many chemical processors. Expensive metal piping wastes away quickly, is a major replacement item.

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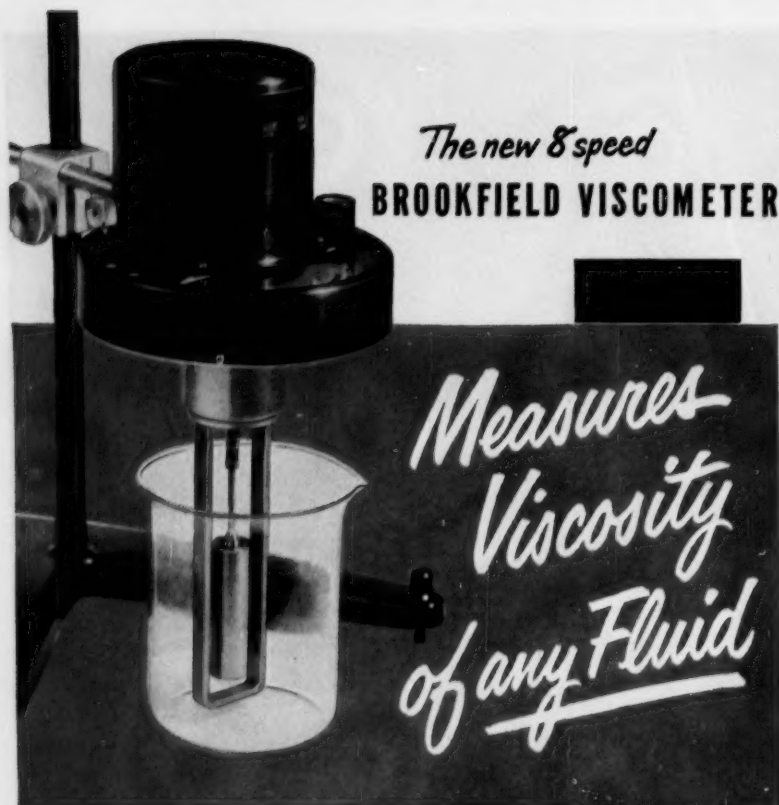
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C W Report

tinues to deter more-extensive usage.

#### POLYURETHANES, OTHER ISOCYANATE POLYMERS

Isocyanate resins, pioneered during the war by Bayer in Germany, are now developing in the U.S. at a frantic pace. Production is still small, but growth seems assured.

Chemical producers Mobay (Monsanto-Bayer), Westvaco, Du Pont, National Aniline, Carwin, et al, are actively interested in the diisocyanate starting materials, while Nopco and many rubber producers are making the elastomers and flexible foams, and Lockheed and other aircraft manufacturers are keeping their collective eye on the rigid foams. A host of companies of all sizes are interested in the isocyanate adhesives, coatings, and potting compounds.

Reaction products of amines and phosgene, the isocyanates are lachrymatory and must be handled with ventilation. Aromatic isocyanates are less toxic than the aliphatics, though more reactive. The isocyanates in most common use are the aromatics containing two reactive groups, such as tolylene diisocyanate (TDI). The price has been dropping steadily with increasing production, and a level around 75¢/lb. is forecast for a few years hence. The coreactant is generally cheaper.

**Wheels and Wings:** Isocyanate resins may be either thermoplastic or thermosetting, depending on the functionality of the reactants. A glycol, or a polyether or polyester with just two terminal hydroxyls, will react with TDI to give a linear polyurethane; but a trifunctional component such as hexanetriol can lead to cross-linking.

The stiffness of the polymer can be regulated at will. Polyurethanes from phthalate polyesters are rigid, while polyadipates and polyethers yield elastomers. The rubbery polyurethanes, free from ozone-sensitive unsaturation, are touted as the tire materials of the future, good for 100,000 miles.

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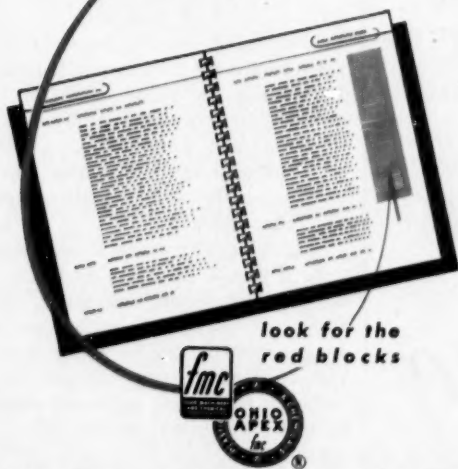
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November 19, 1955 • Chemical Week

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## C W Report

Foams are produced through the action of water on resins containing excess isocyanate groups, frequently with the aid of emulsifiers and tertiary amine catalysts for easier processing. The cells may be interconnected (continuous) or completely enclosed (unicellular). Densities as low as 2-4 lbs./cu. ft. can be produced. No one is quite sure of the outcome of the race between rubber, vinyl, and isocyanate flexible foams; the major rubber companies have money on the newcomers but hope foamed latex will surprise them.

Rigid isocyanate resins, which can be foamed in place inside airplane wings and ship bulkheads, reducing explosion hazards, have already found a profitable market niche.

### EPOXY RESINS

The epoxy resins are among the more promising of the newer materials. Though rather high priced, they are developing new outlets quickly, especially in protective coatings, on the basis of superior resistance to acid and alkali.

As glass-reinforced plastics, they are cured at room temperature to form hard, tough tools and dies for the stamping out of heavy metal sheet parts such as automobile roofs. They retain the shape of the mold precisely, setting without by-product formation and with little shrinkage. Also outstanding as adhesives, they bond unusually well to metals, glass and other materials.

Technological progress in epoxies is rapid. Devoe & Reynolds, Shell, Ciba, Bakelite and Borden are among the leaders in the fusible resins, which are processed further by a large number of coatings and adhesive formulators. Dow, basic in the raw materials, is a potential entrant in this epoxy push.

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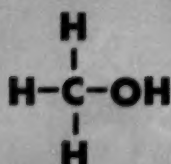
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- **PLASTICS**—intermediate for certain plastics, plasticizers; solvent and solvent adjuvant for certain polymers; softening agent for pyroxylin plastics
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**C W Report**

cations where their high heat resistance and water repellency justify a price of several dollars per pound. Raw materials are cheap: sand and coke for metallic silicon, methanol and hydrochloric acid for methyl chloride. But the multistep processes require much power, equipment and labor.

Silicone rubbers are linear dimethyl siloxanes, milled with inorganic fillers and vulcanized with peroxides. They are stable in continuous use at 150 C, yet retain their flexibility at -90 C. Resistant to mineral oils, they serve well as gaskets and in electrical equipment.

At present, Dow-Corning, General Electric and Linde share the market.

**Future**

Optimism is the keynote, both in the commercial development offices, where the immediate future is charted, and in the laboratories, where long-range prospects are enhanced.

The industry has its problems, of course. In PVC, increased demand has taken up most of the slack; but resin producers are apprehensive of the price competition that may come from integrated processors. The vinyl film industry has been plagued by the philosophy "Lose a little on every pound, make it up in volume." Vinyl acetate polymerizers such as Borden and National Adhesives will have rough competition from companies using captive monomer. Polyesters have only begun to repay the development costs of the past decade. The four majors in polystyrene are hedging with polyethylene.

On the whole, however, there is blithe confidence in the bullish predictions of the market researchers. Virtually every plastic material is expected to make progress in the years ahead. Even mature plastics such as phenolics, ureas and cellulose acetate will benefit from aggressive and imaginative market development. Phenolic-molded furniture drawers, just beginning to sell, typify the "obvious" applications waiting to be promoted.

But the greatest relative gain will be in plastics developed in the '40s or late '30s: polyethylene and vinyls among the large-volume resins; nylon, epoxies, polyesters, fluorocarbons, silicones among the newcomers.

**High Road and Low:** As in the past, the newer plastics will grow with the newer industries. What the electrical industry did for phenolics, electronics may do for polyethylene, epoxies, fluorocarbons, silicones. Miniaturization and encapsulation will require their better dielectric properties, plus superior heat resistance. The older plastics will also benefit: phenolic laminates for printed circuits, molded urea and styrene cabinets in place of metal for color TV.

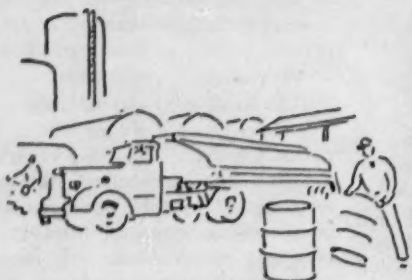
In transportation, the lead in plastics usage has been taken by the aircraft industry, acutely aware of weight down to the last melamine coffee cup. A civilian plane, 90% reinforced polyester, will soon be on the market, selling for about \$9,000. Rigid polyurethane, foamed in place, is already filling dead space in airplane wings (lessening explosive hazard) and in ships (making them virtually unsinkable). Sandwich panels are already in use on trucks and trailers, and it seems imperative for the railroads also to reduce weight with plastics if they are to improve their pay load ratio.

The construction industry, big and slow-moving, needs to be awakened to the profit potentialities in plastics. But the impetus will have to come from outside. Restrained by such ultraconservatives as Sewell Avery of U. S. Gypsum, the companies that supply the building trades are not interested in promoting "new-fangled" materials.

Plastics have made considerable headway, nevertheless. More than half of all indoor paint is now "do-it-yourself" emulsions, principally high-styrene-butadiene, and there will be a noisy battle as vinyl acetate and acrylics push their way in. Polyvinyl acetate has also proved itself in outdoor paint under the hot California sun. Vinyl wall covering with a pressure-sensitive adhesive backing, introduced by Decora last year, has produced sensational sales as well as technical headaches. Phenolic-melamine-laminated work tops and paneling,

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## C W Report

vinyl flooring for living room as well as kitchen, economical polystyrene bathroom tile are in increasing demand.

But the big construction uses for plastics have yet to be developed. Polyvinyl acetate-reinforced cement, re-usable forms of polyester for pouring complex shapes in concrete, structural panels of phenolic-bonded wood waste surfaced with melamine, structural sandwiches with waterproof plastic facings on the outside, acrylic and translucent polyester glazing, plastic foam insulation—these can be large-volume outlets for plastics when the barriers of price and inertia have been hurdled.

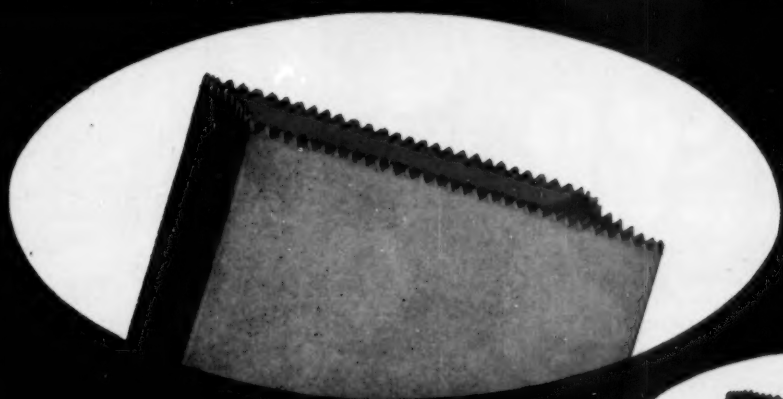
**Chance of Fame:** Meanwhile, the researchers are busy; the Patent Office discloses a dozen new plastics inventions every Tuesday. The last complete survey of synthetic resins, issued by Carleton Ellis 20 years ago when production was only 4% of its present level, contained 2,000 pages of terse references. An encyclopedia would be needed to tell the whole story today.

A few resins—a tiny proportion of the total—will achieve commercial importance. No one can pick these out with certainty; but the following trends seem to have economic significance:

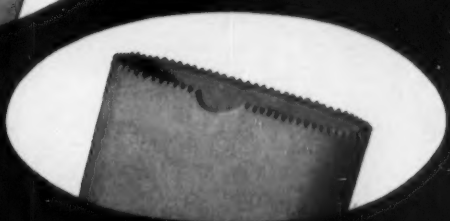
- A prime part of the plastics program is the continuing search for more order in the molecule. Crystalline polyethylene has rocked the plastics world; crystalline polystyrene could be next. The newer thermosets—polyesters, epoxies, urethanes—are constructed according to the chemist's blueprints, unlike phenolics and amino resins, which "just grew."

- Plastics men are just learning how to make the right "polyblends," mechanical mixtures of polymers with the best properties of both. As witness: phenolic and rubber, polyethylene and polyisobutylene, polystyrene and GR-S or GR-N rubber, vinyl and GR-N, vinyl and ethyl cellulose, etc.

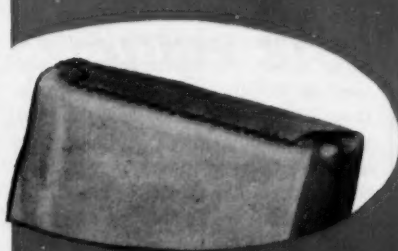
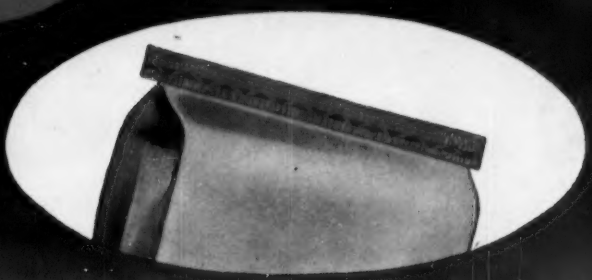
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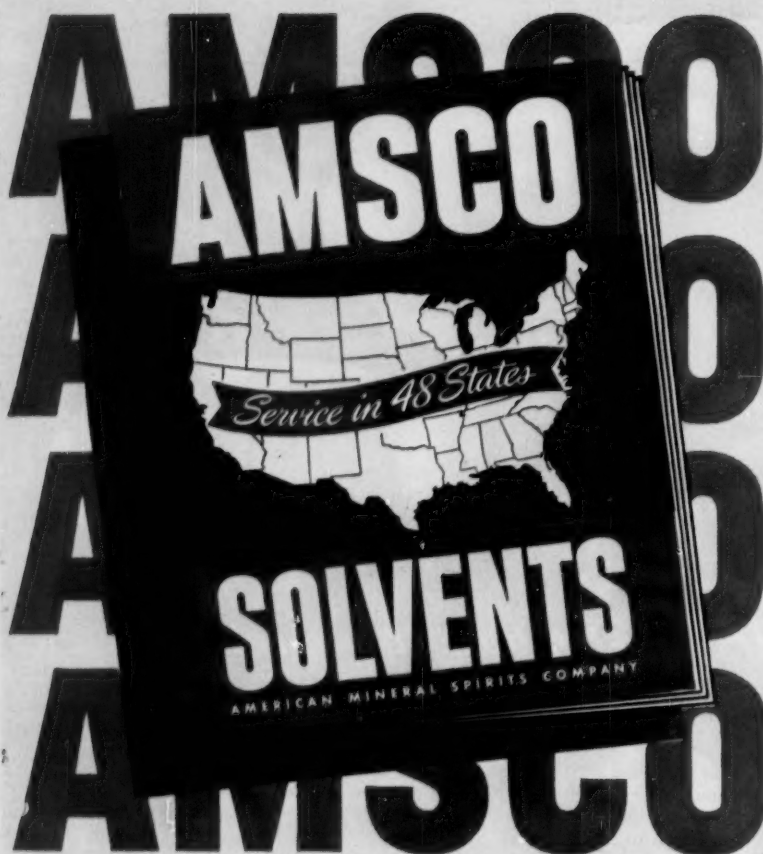
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### CW Report

crossing the more expensive thermosets with cheaper varieties, yielding hybrids of urea with melamine, with phenolic, with epoxy, with alkyd, with silicone, etc. (but not all at once). Random copolymerization has produced valuable vinyls, cellulose, nylon, styrene resins; now block and graft copolymerization may give us cheaper terephthalates, better elastomers.

- Researchers have already shown that irradiation from radioactive wastes can be utilized profitably to make cross-linked, heat-resistant polyethylene; to polymerize solid monomers such as vinyl carbazole; to give polymers of exceptional purity because the catalyst disappears. But the inherent potential in this development is still far from filled.

- High-temperature plastics are still needed for the structural parts of jet aircraft and in ultrahigh-frequency electronics. Promise is seen in the phenylene group, present but diluted in terephthalates, epoxies, phenolics, isocyanate polymers. The attractive heat resistance of fluorocarbons and silicones has prompted examination of other elements in the upper right portion of the periodic table. Sulfones, from cheap sulfur dioxide, could become a leading plastic if Phillips researchers find the answer to some technical problems. Organic phosphorus compounds are being investigated; boron and aluminum could be next. Valuable new families of plastic materials may be in the making.

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**TESTS PROVE** it pays to specify coatings formulated with **BAKELITE** Resins



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That is the case history of the Columbus Sucker Rod Company, Columbus, Ohio, about their profitable experience with coatings based on **BAKELITE** Brand Phenolic Resin.

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## Noncaptive Plastics †

COMPANY	CHEMICAL NAME	GRADE	SPECIFIC GRAVITY OR DENSITY	PRICE (\$/LB.)	MAJOR USES
<b>Vinyls</b>					
Amalgamated Chem. Corp.	polyvinyl acetate	—	1.00	0.42	textile sizing and adhesives
	plasticized polyvinyl acetate	—	1.00	0.30	"
American Molding Powder & Chemical Corp.	polyvinyl chloride and copolymers	—	1.40-1.70	0.33-0.44	garden hose, channels, automotilbe items, extrusions of all kinds
John L. Armitage & Co.	vinyl plastisols and organisols	custom	—	—	—
Bakelite Co. Div. U.C.C.	vinyls	—	—	—	—
Beech-Nut Packing Co.	polyvinyl acetate	low m.w.	1.17	0.295	coatings and adhesives
	" (R-2400)	"	1.15	0.36	"
	" (R-1200)	"	1.19	0.295	"
	" (R-4000)	"	1.19	0.295	"
	vinyl acetate copolymer (EC-103)	emulsion	9.1/gal.	0.235	"
	" (EC-300)	"	9.1/gal.	0.235	"
	" (EC-301)	"	9.1/gal.	0.235	"
	polyvinyl acetate (E-103)	"	9.2/gal.	0.19	"
	" (E-220)	"	9.1/gal.	0.19	"
	" (E-300)	"	9.2/gal.	0.19	"
The Borden Co., Chem. Div.	polyvinyl alcohol	partly and fully hydrolyzed	—	0.715-1.00	adhesives, coatings, films
	" acetate	low, medium and high viscosity	—	0.417-0.617	adhesives, coatings, ink and lacquer base
	vinylidene chloride copolymer emulsions	water emulsions	—	0.39*	coatings, paper, leather
	vinyl chloride copolymer emulsions	"	—	0.265-0.30*	coatings, textiles
	polyvinyl acetate solutions	various solvents	—	0.26*	"
	" emulsions	water emulsions	1.10	0.19*	adhesives, paints, coatings
	polyvinyl acetate solutions emulsions	—	1.09	—	paints, coatings, binders
Celanese Corp. of America, Plastics Division	polyvinyl acetate emulsion (CL-100)	low m. w.	9.2	0.17	coatings and adhesives
	" (CL-101)	"	9.2	0.17	"
	" (CL-102)	"	9.2	0.19	"
	vinyl acetate copolymer (CL-201)	"	9.1	0.19	"
	" (CL-202)	"	9.1	0.19	"
Chemore Corp.	polyvinyl chloride (Vipla K)	—	1.40	0.30	film, sheet, elastomeric extrusions, artificial leather, toys, foam
	" (Vipla PE)	—	1.40	0.33	"
Colloids, Inc.	polyvinyl acetate copolymers	high-low viscosity	—	0.51*	textile sizing, paper coatings

† From information supplied by the manufacturer.

\*Qualified.

## CW Report

COMPANY	CHEMICAL NAME	GRADE	SPECIFIC GRAVITY OR DENSITY	PRICE (\$/LB.)	MAJOR USES
Crown Chemical Co., Inc.	polyvinyl acetate	low-particle-size emulsion	1.20	0.195	coatings
Diamond Alkali Co.	polyvinyl chloride (Diamond PVC-50)	general purpose	0.52-0.55 g/cc.	0.31	film, sheeting, wire coating, hose, tubing, channels
	polyvinyl chloride (Diamond PVC-45)	"	0.49-0.52 g/cc.	0.31	film, sheeting, hose, tubing, channels
The Dow Chemical Co.	polyvinyl chloride	general purpose	1.40	0.31	shower curtains, auto upholstery, wire coating
	polyvinylidene chloride (Saran)	"	1.65-1.72	0.39	seat covers, outdoor furniture, upholstery, screening, carpeting
E. I. du Pont de Nemours & Co.	vinyl polymer-vinyl acetate copolymer (Elvalan)	alkali soluble; solvent soluble	—	0.65	loom finishing of dope-dyed acetate yarn; textile sizing
	polyvinyl alcohol (Elvanol)	partly hydrolyzed (88%); high, medium & low viscosities	1.21-1.31	0.76-0.91*	emulsifier, adhesives, textile sizing, protective coatings
	"	completely hydrolyzed; high, medium & low viscosities	1.21-1.31	72.50*	adhesives, paper coatings, textile finishes, film, protective coatings
	polyvinyl acetate emulsion (Elvacet)	55% solids dispersion	9.2 lbs./gal.	—	adhesives, paints, paper coatings, textile finishes
Fiberfil Corp.	polyvinyl chloride-fiberglass	custom	—	—	industrial
Firestone Plastics Co.	polyvinyl chloride (Exon 402)	—	1.40	0.31*	unplasticized rigid applications
	vinyl chloride copolymer (Exon 450)	—	1.36	0.35*	printing inks, stripings, coatings, protective liners
	vinyl chloride copolymer (Exon 468)	—	1.36	0.35*	phonograph records and printing inks
	" (Exon 480)	—	1.36	0.35*	adhesives and protective coatings
	" (Exon 470)	—	1.31	0.55	protective coatings
	" (Exon 471)	—	1.31	0.50	coatings, moldings, forms
	polyvinyl chloride plastisol (Exon 654)	—	1.40	0.34*	film, sheeting, hose, gaskets, belting, molded sections
	polyvinyl chloride resin (Exon 905-915-925)	—	1.40	0.31*	toys, yarn and fabric coatings
Flexible Products Co.	vinyl plastisols	elastomeric	1.15	0.40-0.50	film, sheeting
General Tire & Rubber	polyvinyl chloride (Vygen-100)	calendering-extrusion	1.40	0.31	gaskets, welting, bumpers, electrical insulation, toys
Gering Products, Inc.	polyvinyl chloride	virgin elastomeric	1.21-1.35	0.33*	wire and cable insulation, film and sheeting, extruded and molded shapes, garden hose
B. F. Goodrich Chem. Co.	polyvinyl chloride (Geon 101, 101 EP, 103 EP)	—	1.40	0.31*	phonograph records, flooring
	polyvinyl chloride copolymer (Geon 400X78)	—	1.32	0.35	protective coatings on metal, cloth, paper
	polyvinyl chloride copolymers (Geon 200X72, 400X74-L, 400X110, 400X80)	—	1.33-1.52	0.35-0.45*	coated fabrics, toys, vinyl foam
	polyvinyl chloride (Geon 121)	—	1.40	0.34*	tie coats, fiber binders, paper coatings
	polyvinyl chloride polymer & copolymers (Geon Latex 151, 251, 351, 352, 576, 552, 652, 450 X167)	—	1.19-1.60	0.29-0.39*	

\*Qualified.

# CW Report

COMPANY	CHEMICAL NAME	GRADE	SPECIFIC GRAVITY OR DENSITY	PRICE (\$/LB.)	MAJOR USES
B. F. Goodrich Chem. Co.	polyvinyl chloride (Geon 404 HI)	high impact	1.35	0.40*	high-impact calendered sheet for tank linings, printing plates, structural uses
	polyvinyl chloride—Hycar rubber (Geon Polyblend 503 H)	————	1.18	44.5*	wire and cable insulation, flooring, extruded shapes
	vinyl chloride—vinylidene chloride copolymer (Geon 202)	————	1.41	0.31*	film and sheeting, extruded shapes
Goodyear Tire & Rubber Co.	vinyl chloride copolymer	dispersion	1.40	0.34	toys, foam, fabric coatings, cast sheet, dipped goods, glove coatings
	polyvinyl chloride	electrical	1.40	0.31	insulation, electrical tape
	polyvinyl chloride	dryblend	1.40	0.31	film sheeting, shapes (extrusion) cable, jacket-coated fabric
	vinyl chloride	dispersion resin	21.5 lbs./ft. <sup>3</sup>	0.34*	coatings for awning fabrics, lawn furniture fabrics, toys
	straight polyvinyl chloride	calendering for film	44 lbs./ft. <sup>3</sup>	0.31*	film and sheeting (shower curtains, raincoats, drapes)
	"	extrusion, general purpose	44 lbs./ft. <sup>3</sup>	0.31*	garden hose, medical tubing, vinyl welting
Goodyear Tire & Rubber Co. Chem. Div.	"	calendering	40 lbs./ft. <sup>3</sup>	0.31*	film and sheeting (shower curtains, raincoats, drapes)
	straight polyvinyl chloride	extrusion	38 lbs./ft. <sup>3</sup>	0.31*	garden hose, medical tubing, vinyl welting
	"	electrical	38 lbs./ft. <sup>3</sup>	0.31*	insulation for electrical wire, cable jacketing
Grant Chemical Co.	polyvinyl chloride (GC7520)	————	1.23	0.44*	————
	" (GC4100)	————	1.21	0.40*	————
	" (GC3500)	————	1.31	0.47	————
	" (GC5210)	————	1.33	0.455*	wire
	" (GC6210)	————	1.36	0.345*	————
	" (GC7210)	————	1.21	0.45*	garden hose
	" (GC8210)	general purpose	1.23	0.41*	————
	" (GC6900)	"	1.37	0.345*	————
Houghton Labs., Inc.	vinyl plastisols (Hysol 3000 series)	all grades	1.02-1.40	0.45-0.75	coatings and electrical insulation
Monsanto Chemical Co.	polyvinyl chloride	compounding	1.40	0.31	film, sheeting, wire, cable, hose, profile shapes, flooring
	"	dispersion resin	1.40	0.34	textile and paper coating, molded toys, industrial components, foams
	polyvinyl chloride/polyvinyl acetate copolymers	————	1.36	0.35	flooring, phonograph records
National Casein Co.	polyvinyl acetate (#5000)	adhesive	9.2 lbs./gal.	0.28*	wood adhesive
National Starch Products, Inc. Resin Div.	polyvinyl acetate	emulsion and solution	1.20	0.30-0.50*	paints, adhesives, binders
Naugatuck Chemical Div. of U. S. Rubber Co.	polyvinyl chloride	dispersion	1.40	0.34*	cloth coating, slush molding, dipping foaming, etc.
	"	general purpose	————	0.31*	film and sheeting, wire covering, etc.
	"	rigids	————	0.35*	pipe and fittings, rigid sheet, etc.
	polyvinyl chloride compounds	electrical, extrusion, molding	————	0.285-0.53*	extruded film, garden hose, wire covering, conduit jacket, medical tubing, etc.

\*Qualified.

## CW Report

COMPANY	CHEMICAL NAME	GRADE	SPECIFIC GRAVITY OR DENSITY	PRICE (\$/LB.)	MAJOR USES
Naugatuck Chemical Div. of U. S. Rubber Co.	polyvinyl resin (Marvinol)	electrical, extrusion	1.40	0.31	film, sheeting
Onyx Oil & Chem. Co.	vinyl copolymer dispersion (Resin AN-25)	—	—	—	textiles, permanent
	" (Resin S-69)	—	—	—	textiles, cosmetics
	polyvinyl acetate dispersion 40% (Resin AA 40)	—	—	—	textiles
	" 50% (Resin X-99)	—	—	—	textile, paper industries, nylon hosiery finish
	" 55% (Resin 362)	—	—	—	textiles, adhesives
	vinyl copolymer solution (Kordovan)	water soluble	—	—	textiles, permanent size
	polyvinyl acetate solution (Xynotaf HV)	—	—	—	textiles
Paisley Products, Inc. Div. of Morning Star, Nicol, Inc.	polyvinyl acetate emulsion	high and low molecular	9.2 lb./gal.	0.19*	adhesives, coatings, paint and textile sizes
Premier Thermo Plastics Co.	vinyl compound	68 durometer	1.46	0.31-0.34	outdoor exposures
	"	weather resistant	1.46	0.31-0.34	—
	"	95 durometer	1.36	0.34-0.37	upholstery welt
	"	75 "	1.39	0.33-0.36	vacuum cleaner parts
	"	80 "	1.37	0.405-0.435	lacquer resistant
	"	80 "	1.37	0.455-0.485	refrigerator gasket
	"	65 "	1.35	0.36-0.39	—
	"	73 "	1.23	0.44-0.47	transparent tubing for insecticides
Reed Plastics Corp. Rubber Corp. of America	vinyl	elastomeric (Only PVC pilot plant at present; commercial unit will go onstream in about 4 months)	1.35	0.35-0.65	electrical parts
Shawinigan Products Corp.	polyvinyl acetal resin (Alvar)	—	1.16	0.91-1.30	decorative moldings, phonograph records, etc.
Shawinigan Resins Corp.	polyvinyl butyral dispersion	—	1.10	0.72	textile coatings
	polyvinyl butyral solid	—	1.05-1.15	1.04	safety-glass laminate, wash primers, adhesives
	polyvinyl formal	—	1.20	0.85	electrical insulation adhesives, molded products
	polyvinyl alcohol	new plant under construction will make all types	1.2-1.3	0.71-0.84	adhesives, textile and paper sizing, film, molded products, emulsification
	polyvinyl acetate copolymers solid	alkali-soluble	1.20	0.51	adhesives, textiles sizing, surface coatings
	polyvinyl acetate solid	—	1.20	0.29-0.41	adhesives, chewing gum
	polyvinyl acetate emulsions	—	1.11	0.17 (wet basis)	adhesives, textile sizing and coatings, paints
	vinyl plastisols	—	1.10-1.45	0.30-0.70	toys, industrial items
	vinyl organosols	—	1.10-1.35	0.24-0.65	wire coating, textile coatings, metal coatings
Stanley Chemical Co.	vinyl plastisol sponge	general purpose	6 lbs.-22 lbs./ft. <sup>3</sup>	varies	insulation, toys, tapes
	vinyl plastisol " (77X1078)	chemical resistant	varies 10.27 lbs./gal.	varies 0.545 (base)	doll parts, bicycle saddles plating racks, materials handling equipment
Watson Standard Co.	vinyl plastisols	—	1.10-1.45	0.30-0.70	toys
	vinyl organisols	—	1.10-1.35	0.24-0.65	wire coatings, textile coatings, metal coatings

## Polystyrenes

American Molding Powder & Chemical Corp.	polystyrene	general purpose	1.075	0.29-0.32	toys, wall tile, containers
	"	special effects	1.075	0.39-0.45	toys, containers, buttons, wall tile
	"	high impact	1.075	0.36	containers, toys

\* Qualified.

# CW Report

COMPANY	CHEMICAL NAME	GRADE	SPECIFIC GRAVITY OR DENSITY	PRICE (\$/LB.)	MAJOR USES
Bakelite Co. Div. U. C. C.	polystyrene	—	—	—	—
The Borden Co., Chem. Div. Catalin Corp. of America	polystyrene copoly- mer emulsions	water emulsion	—	0.182-0.25*	cosmetics, coatings
	polystyrene	general purpose	1.05-1.07	0.29	toys, novelties, wall tiles, food containers, hangers
	"	heat resistant	1.05-1.07	0.29	radio cabinets, lamp shades, battery cases, coil forms, bristles
	"	medium impact	1.06	0.34	toys, novelties, coat hangers, food containers
	"	high impact	1.04-1.06	0.315	refrigerator door panels, drawers, vacuum form- ing shears
Dewey & Almy Chemical Co.	styrene-butadiene	—	1.01	—	all types of rubber stock
	"	—	1.04	—	all types of rubber goods, particularly shoe heels and soles
The Dow Chemical Co.	polystyrene (Styron 700)	high heat distor- tion 220 F	1.05-1.07	0.29	radio cabinets, battery cases, coil forms, bristles
	" (Styron 475)	high impact	1.05-1.07	0.55*	refrigerator parts, toys, display pieces, packag- ing
	" (Styron 683)	medium heat resistant 205 F	1.05-1.07	0.29	appliance knobs, radio cabinets, extruded film and sheet, display racks
	" (Styron 666)	general purpose	1.05-1.07	0.29	rigid containers, wall tile, toilet seats, coat hang- ers, food containers
	" (Styron 480)	extra high impact	1.04	0.365	freezer lids, action toys, tote boxes, children's furniture
	" (Styron 475)	high impact	1.05	0.315	refrigeration parts, toys, housewares, air condi- tioners, containers
	— (Styrex 767)	high elongation, moderate tough- ness, chemical resistant	1.08	0.41	tumblers, cutlery handles, bristles, food containers, aerosol nozzles
	polystyrene (Styron 688)	controlled flow	1.05	0.29	thin wall containers, wall tile, brush backs, boxes, egg crates
Fiberfil Corp.	styrene copolymer- fiberglass	rigid	—	0.90	—
	polystyrene- fiberglass	general purpose	1.30	0.65	—
	polystyrene	general purpose and specialties	—	0.30-0.50	—
	polystyrene cross- linked (TS)	—	1.12-1.16	0.75-1.00	—
	polystyrene-fiber- glass (BXC25)	—	1.30	0.65-0.75	—
Foster Grant Co., Inc.	polystyrene	high impact	1.05	0.31-0.34	toys, refrigeration parts
	"	regular	1.05	0.28-0.31	—
Gering Products, Inc.	polystyrene	standard	1.05	0.295*	toys, housewares, radio cabinets, television parts
Goodyear Tire & Rubber Co., Chem. Div.	styrene copolymer	medium impact	1.05	0.52	mechanical goods
	"	supermedium impact	1.05	0.37	sheet (for post forming)
	modified high styrene	high impact	—	0.52*	reinforcing resin for vari- ous rubber products
	"	"	—	0.37*	serving trays, business machine housings, TV masks, panelling
	styrene copolymer	solution	1.05	0.88	paper coatings
	"	compounding	1.05	0.39	shoe soles, mechanical goods, hose, extruded items
	"	solution	1.05	0.50	coatings, masonry paints, chemical finishes, metal finishes

\*Qualified.

## CW Report

COMPANY	CHEMICAL NAME	GRADE	SPECIFIC GRAVITY OR DENSITY	PRICE (\$/LB.)	MAJOR USES
Koppers Co., Inc.	polystyrene	—	1.04-1.06	0.32-1.00	lighting fixtures
	" (Evenglo)	normal	1.04-1.06	0.29-0.31	housewares, refrigeration, wall tile, indoor displays
	polystyrene modified (Dylene)	high impact	1.04-1.06	0.315-0.38	radio and television, packaging, refrigerator parts, housewares, toys
	"	medium impact	1.04-1.05	0.34-0.375	radio and television, packaging, housewares
	expandable polystyrene (Dylite)	—	—	0.50-0.60	thermal insulation, toys, buoyant members, sandwich constructions
Luminous Resins, Inc.	luminous polystyrene	general purpose	—	—	moldings
Marbon Chemical, Div. Borg-Warner Corp.	styrene polymer	high impact—high heat	1.01	0.65	radios, cases, electrical and structural items miscellaneous uses
Monsanto Chemical Co.	polystyrene	soft flow	1.05	0.32	packaging, combs, brush backs
	"	general purpose	1.05	0.32	wall tile, packaging, housewares
	"	heat resistant	1.05	0.32	radio cabinets, battery cases
	"	high impact	1.05-1.08	0.345	refrigeration, air conditioning units, toys
	"	medium impact	1.05-1.10	0.34	radio cabinets, toys
H. Muehlstein & Co., Inc.	polystyrene	high impact	—	—	injection molding
Reed Plastics Corp.	"	general purpose	—	—	"
	polystyrene	general purpose	1.10	0.295-0.625	refrigeration wall tile, TV, radio, batteries, tools
	"	impact	1.08	0.32-0.85	"
	polystyrene-acrylonitrile copolymer	—	1.10	0.45-0.95	chemical ware, dishes, batteries

## Polyethylene

American Molding Powder & Chemical Corp.	polyethylene	—	1.00	0.41-0.75	pipe, bottles, extrusions
Bakelite Co. Div. U.C.C.	polyethylene	—	—	—	—
The Dow Chemical Co.	polyethylene	—	0.92	0.41	film, housewares, toys, bottles, closures, pipe, wire covering
E. I. du Pont de Nemours & Co.	polyethylene (Alathon 4)	—	0.93	0.53-0.575	cable jackets
	" (Alathon 3)	—	—	0.45-0.49	base resin for wire and cable compounds; molding
	" (Alathon 22)	—	0.92	0.41-0.45	glossy moldings
	" (Alathon 20)	—	0.92	0.43-0.47	molding, blown bottles
	" (Alathon 25)	—	0.92	—	jet well installations, industrial installations, irrigation, land drainage, watering lines and systems
	" (Alathon 16)	—	0.923	0.41-0.45	coated papers, etc., deep-draw molding
	" (Alathon 14)	—	0.92	0.41-0.45	film, general-purpose molding
	" (Alathon 12D)	—	0.92	0.41-0.45	film
	" (Alathon 12)	—	0.92	0.41-0.45	"
	" (Alathon 5)	—	0.93	0.46-0.505	line wire jacket
	" (BK-22)	—	—	—	—
	" (Alathon 5)	—	0.92	0.46-0.505	TV lead-in wire
	" (BN-07)	—	—	—	—
	" (Alathon 6)	—	0.44	0.535-0.575	high-frequency, low-cost insulation
	" (Alathon 10)	—	0.92	0.43-0.47	film, general-purpose molding, coated base stocks
	" (Alathon 5)	—	0.93	0.46-0.505	infantry field wire
	" (BK-21)	—	—	—	insulation
	" (Alathon 5 & 5B) (NC-10)	—	0.92	0.43-0.47	high-frequency and high-voltage insulation
	polyethylene (Tenite Polyethylene)	all standard types plus special items	0.92	0.35-0.72	toys, housewares, pipe, wire and cable covering, blown bottles
Eastman Chemical Products, Inc.	polyethylene	—	—	—	—

## CW Report

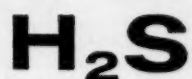
COMPANY	CHEMICAL NAME	GRADE	SPECIFIC GRAVITY OR DENSITY	PRICE (\$/LB.)	MAJOR USES
Fiberfil Corp.	polyethylene and fiberglass	rigid	1.20	1.00*	battery cases, industrial parts
Gering Products, Inc.	polyethylene (Gering PE)	general purpose	0.92	0.41*	toys, housewares, squeeze bottles, closures, etc.
Koppers Company, Inc.	polyethylene (Dylan)	—	0.94	0.43-0.48	kitchen utensils, pipe and fittings, washing machine agitators, bottles
Luminous Resins, Inc.	luminous polyethylene (Paulite)	—	—	—	moldings
Monsanto Chemical Co.	polyethylene (Orizon 306)	—	0.92	0.41	packaging
	" (Orizon 204)	—	0.92	0.43	cosmetics, drugs, pharmaceuticals
	" (Orizon 507)	—	0.92	0.41	household and industrial chemicals packaging
	" (Orizon 705, 805, 905)	—	0.92	0.41	housewares, toys, packaging
H. Muehlstein & Co., Inc.	polyethylene	—	0.92-0.97	—	injection molding, extrusion
Phillips Chemical Co.	ethylene polymer	high (90%-95%) crystallinity	0.96	not yet announced	film, fibers, housewares, containers, wire and cable, laminates
Reed Plastics Corp.	polyethylene	general purpose	1.18	0.60-0.90	jewelry, radio parts
		rigid	0.95	0.42-0.75	—
Semet-Solvay Petrochemical Div. Allied Chemical & Dye Corp.	polyethylene (A-C Polyethylene 6)	—	0.92	0.30-0.37	dairy cartons, printing inks, paper coating, rubber processing
	" (A-C Polyethylene 7)	—	0.92	0.35-0.42	rubber processing
	" (A-C Polyethylene 615)	—	0.92	0.38-0.45	paper coating
	" (A-C Polyethylene 617)	—	0.92	0.30-0.37	rubber processing, investment waxes
	" (A-C Polyethylene 629)	—	0.92	0.40-0.47	shingle coating, floor and furniture polishes
	" (A-C Polyethylene 729)	—	0.92	0.45-0.52	"
	" (A-C Polyethylene G-201)	—	0.92	0.38-0.45	dairy cartons
	"	—	—	—	—
Spencer Chemical Co.	polyethylene (Poly-Eth 1003 Nat.)	melt index 0.5	0.92	0.42*	molded items
	" (Poly-Eth 1004 Nat.)	melt index 1	0.92	0.41*	"
	" (Poly-Eth 1005 Nat.)	melt index 2	0.92	0.41*	"
	" (Poly-Eth 1007 Nat.)	melt index 8	0.92	0.41*	"
	" (Poly-Eth 1008.5 Nat.)	melt index 24	0.92	0.41*	"
	" (Poly-Eth 3015 Blk.)	melt index 2	0.92	0.35*	pipe
	" (Poly-Eth 5015 Blk.)	"	0.92	0.35*	"
	"	—	—	—	—
	"	—	—	—	—
	"	—	—	—	—
U. S. Industrial Chemicals Co.	polyethylene (Petrothene 300 Series)	electrical	0.92	—	electrical insulating applications
	" (Petrothene 100 Series)	film	0.92	0.43	polyethylene film
	" (Petrothene 200 Series)	general purpose	0.92	0.41	film, sheet, moldings and extrusions
	"	—	—	—	—

## Cellulosics

American Molding Powder & Chemical Co.	ethyl cellulose	all grades molding powder	1.125	0.72	housings, defense program
	cellulose acetate	all grades	1.32	0.35-0.50	toys, handles, sheets, tool handles, packaging
Celanese Corp. of America, Plastics Division	cellulose acetate	Groups I, II & III	1.27-1.37	0.35-0.59	toys, dolls, industrial
	cellulose propionate	all grades	1.20	0.50-0.81	telephones, helmets, pens and pencils, knobs, optical frames

\*Qualified.

to remove



use

***Monoethanolamine***  
***Diethanolamine***

high purity  
**NITROGEN DIVISION**  
chemicals



Maximize the purity of your gas stream, and minimize corrosion problems by using Nitrogen Division gas-treating chemicals. Free of unwanted chemical impurities — chlorides and acids — these products are consistently above standard purity specifications.

Call or write today for samples and quotations. Ask too for technical service to help adapt these high purity chemicals to your process.

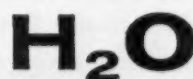
### **NITROGEN DIVISION**

ALLIED CHEMICAL & DYE CORPORATION  
40 Rector Street, New York 6, N. Y.

Hopewell, Va. • Ironton, Ohio • Orange, Tex. • Omaha, Neb.

Anhydrous Ammonia • Ammonia Liquor • Ammonium Sulfate • Sodium Nitrate • Methanol • Urea  
Ethanolamines • Ethylene Oxide • Ethylene Glycols • Formaldehyde • Nitrogen Tetroxide  
Nitrogen Solutions • U.F. Concentrate—85 • Fertilizers & Feed Supplements

to remove



use

***Diethylene Glycol***  
***Triethylene Glycol***

high purity  
**NITROGEN DIVISION**  
chemicals

Maximize the purity of your gas stream, and minimize corrosion problems by using Nitrogen Division gas-treating chemicals. Free of unwanted chemical impurities — chlorides and acids — these products are consistently above standard purity specifications.

Call or write today for samples and quotations. Ask too for technical service to help adapt these high purity chemicals to your process.

### **NITROGEN DIVISION**

ALLIED CHEMICAL & DYE CORPORATION  
40 Rector Street, New York 6, N. Y.

Hopewell, Va. • Ironton, Ohio • Orange, Tex. • Omaha, Neb.

## CW Report

COMPANY	CHEMICAL NAME	GRADE	SPECIFIC GRAVITY OR DENSITY	PRICE (\$/LB.)	MAJOR USES
The Dow Chemical Co.	ethyl cellulose (Ethocel)	—	1.10	0.72	refrigerator and furniture trim, knife handles, flashlight cases, camera cases, hammer heads
E. I. du Pont de Nemours & Co., Inc.	cellulose nitrate	—	—	—	industrial coatings, coated fabrics, adhesives
	sodium carboxymethylcellulose	—	—	—	thickener, dispersant, emulsifier, paper additive, textile size, drilling mud additive
Eastman Chemical Products, Inc.	cellulose acetate butyrate (Tenite Butyrate)	standard types	1.20	0.50-0.81	telephones, steering wheels and armrests, pipe, tool handles, pens and pencils, film, rod and sheets
	cellulose acetate (Tenite Acetate)	all standard types	1.30	0.33-0.74	toys, knobs, closures, tool and cutlery handles, housings, toilet seats, film, tubing, rod and sheets
Fiberfil Corp.	cellulose acetate fiberglass	custom and flame resist.	—	—	—
Gering Products, Inc.	cellulose acetate	general purpose	1.27	0.35*	toys, tool handles, brushes, tool parts
Hercules Powder Co.	cellulose acetate	opaque and transparent	1.30	0.46-0.50	brush blocks, film and sheet, handles, buttons, housings
Luminous Resins, Inc.	ethyl cellulose	—	1.10	0.72	military housings, flashlights, tool handles
	cellulose acetate (Paulite)	—	—	—	all moldings
	cellulose acetate butyrate (Paulite)	—	—	—	—
H. Muehlstein & Co., Inc.	cellulose acetate butyrate	—	1.26-1.34	—	injection molding
	ethyl cellulose	—	1.15-1.22	—	"
	cellulose acetate	—	1.09-1.17	—	"
Peerless Chemical Corp.	cellulose acetate	—	—	—	toys, pens, toilet seats, screw driver handles, coat hangers
Reed Plastics Corp.	cellulose acetate butyrate	—	1.20	0.40-0.80	tools
	cellulose acetate	—	1.25	0.36-0.70	buttons, tools

### Nylon (polyamides)

Barrett Div. Allied Chemical & Dye Corp.	nylon molding compound (Plaskon)	—	1.13	—	gears, bushings, monofilament, wire covering, coil forms, rods, tape
Boody Resineers E. I. du Pont de Nemours & Co.	polyamide nylon	water soluble	1.23	0.40	protective coatings
	(Zytel 63)	—	1.13	2.10	wire jacketing, sheeting, packings, seals, textile coating
	" (Zytel 211)	—	1.13	1.435-1.60	impact devices, parts requiring exceptional toughness
	" (Zytel 69)	—	—	2.50	jacketing for mechanical cables and ropes, impact devices
	" (Zytel 61)	—	1.13	2.10	adhesives, automotive, aviation, finishes, glass, textile, metal
	" (Zytel 105)	—	—	1.535-1.70	agricultural machinery, sporting goods, marine hardware, automotive components, electrical equipment, toys, wire jacketing
	" (Zytel 33)	—	—	1.685-1.85	wire jacketing
	" (Zytel 31)	—	1.09	1.585	wire jacketing, special mechanical molding
	" (Zytel 105)	—	—	1.535-1.70	automotive parts, electrical parts, weather-resistant moldings
	" (Zytel 101)	—	1.14	1.435-1.60	general-purpose molds, i.e., mechanical parts, sterilizable items

\*Qualified.

another great  
advance in  
economy for  
**BULK MATERIAL**  
shippers!

# TOTE\* SYSTEM now offers the NEW, TESTED Container Car

Permits rail shipments of bulk materials without freight costs on forwarding and return of Tote Containers.



This car was recently introduced by Shippers Car Line Corporation of New York City and Tote System, Inc. Twenty-eight Tote containers are securely shored in place on the car. Upon arrival at destination, the shoring bars swing easily out of place for unloading. One man can completely unload the car in 35 minutes using a battery powered walkie-type lift truck.

**LOAD IT**  
**TRANSPORT IT**  
**DISCHARGE IT**

## here's how this MODERN COMPLETE BULK HANDLING SYSTEM saves you money!

Tote System is a complete bulk material handling system built around sturdy aluminum containers, plus automatic filling and discharging equipment. It is now being used by hundreds of manufacturers and processors for inter-plant shipment of bulk materials; for in-plant storage and handling; and for accurate and automatic weighing, mixing and blending.

Tote System SAVES time and labor . . . container costs . . . losses due to contamination and deterioration . . . losses due to breakage, spillage and sifting . . . losses due to rodents, insects and weather. Tote System also SAVES investment in expensive fixed storage and conveying equipment. Its flexibility and adaptability to changes in plant layout are unmatched.

### and now, with the new **CONTAINER CAR**

It is possible to make long haul shipments of bulk materials in unit containers without any freight costs on the containers themselves . . . to make mixed or split shipments of various bulk materials . . . to simplify shipments to off-rail users.

Tote System engineers are available to help you fit these developments to your specific application. Write at once without obligation.

\*Tote and Tote System Reg. U. S. Pat. Off.

# TOTE SYSTEM, incorporated

820 So. 7th

Beatrice, Nebraska

## CW Report

COMPANY	CHEMICAL NAME	GRADE	SPECIFIC GRAVITY OR DENSITY	PRICE (\$/LB.)	MAJOR USES
Fiberfil Corp.	fiberglass-nylon	semirigid-20	1.30	1.75-1.60	bearings
	"	rigid-30	1.35	1.75-1.435	gears, bearings
General Mills, Inc.	polyamide (Versamid 100-115)	—	0.98	0.60-0.73	coatings, adhesives, castings
	" (Versamid 90)	—	0.98	0.60	"
	" (Versamid 93 94, 95)	—	0.98	0.55	"
National Polymer Products, Inc.	polyamide (Nylatron G)	graphite-filled	1.14	1.75-2.00	bearings, sliding surfaces
	" (Nylasint)	—	1.14*	1.25-5.00	industrial wear and sliding surfaces, gears, bearings, cams
	" (Nylatron GS)	molysulfide-filled	1.14	1.75-2.00	bearings, slides

## Acrylics

American Molding Powder & Chemical Corp.	methyl methacrylate	general purpose	1.20	0.70-0.90	dentures, automobile items, light fixtures
The Borden Co., Chemical Div.	polymethacrylic acid (15% solid)	—	—	—	viscosity index improvements, emulsifier
	decylacrylate-acrylonitrile copolymer	—	—	—	—
	ethylacrylate-acrylonitrile copolymer	—	—	—	—
	polymethylmethacrylate emulsion	—	—	1.00*	casting
	acrylic copolymer solutions	various solvents	—	0.30-0.64*	coatings, adhesives, paper field, textiles
	acrylic copolymer emulsions	water emulsion	—	0.24-0.45*	adhesives, coatings, textiles, paper
	acrylic elastomers	elastic, resilient	—	1.00-2.00	oil seals, packings, hose, gaskets, protective covers
	sodium and potassium polyacrylate solution	solution	—	0.155	thickeners, stabilizers, protective colloid
E. I. du Pont de Nemours & Co.	acrylic resin (Lucite 30)	—	1.18	0.60-0.75	decorative trim, lighting fixtures, signs, jewelry glazing
	" (Lucite 29)	—	1.18	0.60-0.75	"
	" (Lucite 40)	—	1.18	0.60-0.75	lighting fixtures, signs, skylighting, ceiling lighting, decorative trim, glazing, store fronts, jewelry
	" (Lucite 130)	—	1.18	0.65-1.00	automotive parts, toilet articles, bathroom fixtures, signs and displays, costume jewelry, refrigerator parts
	" (Lucite 140)	—	1.18	0.65-1.00	"
	" (Lucite 129)	—	1.18	0.65-1.00	"
Wallace A. Erickson & Co.	modified methylmethacrylate	—	—	1.25-1.75	dental materials
	"	—	—	1.25-1.75	"
General Aniline & Film Corp.	polymethylchloroacrylate	optical	1.47-1.49	—	aircraft glazing
Luminous Resins, Inc.	luminous acrylics	—	—	—	all moldings
Rohm & Haas Co.	acrylic	molding powders	1.18	0.80-1.00	automotive taillights, name plates, appliance identification parts; lighting equipment, brushes
	"	cast sheets	1.18	0.80-1.50*	signs, aircraft enclosures, lighting, glazing, skylights, display

## Fluorocarbons

Bakelite Co. Div. U.C.C.	polychlorotrifluoroethylene (Bakelite Fluorothenes)	—	—	—	—
--------------------------	---	---	---	---	---

\*Qualified.

NM  
CH<sub>3</sub>NO<sub>2</sub>

NE  
CH<sub>3</sub>CH<sub>2</sub>NO<sub>2</sub>

# THE CSC NITROPARAFFINS

## New Stars

to give new direction  
to the chemical industry

2-NP  
CH<sub>3</sub>CHNO<sub>2</sub>CH<sub>3</sub>

1-NP  
CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>NO<sub>2</sub>

### PHYSICAL PROPERTIES

	NM (Nitromethane) CH <sub>3</sub> NO <sub>2</sub>	NE (Nitroethane) CH <sub>3</sub> CH <sub>2</sub> NO <sub>2</sub>	1-NP (1-Nitropropane) CH <sub>3</sub> CH <sub>2</sub> CH <sub>2</sub> NO <sub>2</sub>	2-NP (2-Nitropropane) CH <sub>3</sub> CHNO <sub>2</sub> CH <sub>3</sub>
Molecular Weight	61.04	75.07	89.09	89.09
Boiling Point at 760mm, °C	101.2	114.0	131.6	120.3
Azeotrope with Water, bp, °C	83.6	87.1	91.2	88.4
NP in azeotrope, % by weight	77.1	73.6	64.5	73.1
Vapor Pressure at 20°C, mm	27.8	15.6	7.5	12.9
Evaporation Rate, by volume*	139.0	121.0	88.0	110.0
Freezing Point, °C	-29.0	-90.0	-108.0	-93.0
Specific Gravity at 20/20°C	1.139	1.052	1.003	0.992
Density of Vapors (air = 1.00)	2.11	2.58	3.06	3.06
Weight per U.S. Gallon at 68°F, lb	9.48	8.75	8.35	8.24
Coefficient of Expansion, per °F	0.00064	0.00062	0.00056	0.00058
Refractive Index, n <sub>D</sub> at 20°C	1.3818	1.3916	1.4015	1.3941
Surface Tension at 20°C, dynes/cm	37.0	31.3	30.0	30.0
Heat of Vaporization at 30°C, cal., cal/g	143.3	124.8	107.3	104.4
Heat Capacity at 25°C, cal/g	0.422 <sup>30°C</sup>	0.441	0.471	—
Dielectric Constant at 30°C	35.76	28.00	23.22	25.48
Ignition Temperature, °F	785.0	778.0	789.0	802.0
Flash Point, °F (Tag Open Cup)	112.0	106.0	120.0	103.0
pH 0.01M Aqueous Solution at 25°C	6.4	6.0	6.0	6.2
Solubility in Water at 20°C, % by volume	9.5	4.5	1.4	1.7
Solubility of Water in NP at 20°C, % by volume	2.2	0.9	0.5	0.6

\*N-Butyl Acetate = 100

### NP DERIVATIVES ALSO AVAILABLE

AB (2-Amino-1-butanol)	NMP (2-Nitro-2-methyl-1-propanol)
ACPD (2-Amino-2-ethyl-1, 3-propanediol)	ALKATERGES
AMPD (2-Amino-2-methyl-1, 3-propanediol)	TRIS AMINO (Tris [hydroxymethyl] aminomethane)
AMP (2-Amino-2-methyl-1-propanol)	TRIS NITRO (Tris [hydroxymethyl] nitromethane)
NB (2-Nitro-1-butanol)	HAS (Hydroxylammonium Acid Sulfate)
NEPD (2-Nitro-2-ethyl-1, 3-propanediol)	HC (Hydroxylammonium Chloride)
NMPD (2-Nitro-2-methyl-1, 3-propanediol)	HS (Hydroxylammonium Sulfate)

SAMPLES ON REQUEST

Here are the Nitroparaffins -- NM(Nitromethane), NE(Nitroethane), 1-NP(1-Nitropropane) and 2-NP(2-Nitropropane). These four NP's have a potential range of usefulness unequalled by any other group of organic chemicals! CSC's new Nitroparaffin plant at Sterlington, La. is now in full production. Additional facilities for increased volume of NP derivatives are nearing completion.

In many cases, they provide better and more economical methods of manufacturing well-known and widely used industrial chemicals. However, the majority of the reactions yield entirely new compounds. There are practically an unlimited number of products which can be prepared from the NP's. As solvents, they present an unusual combination of properties -- they are medium-boiling, mild-odored and, most important of all, they have strong solvent power for a wide variety of substances, including many coating materials, waxes, resins, gums, dyes, fats and oils, and numerous organic chemicals. The CSC Nitroparaffins are chemistry's newest stars. They give new direction to the production of old products and the development of new.



# COMMERCIAL SOLVENTS

260 MADISON AVENUE CORPORATION NEW YORK 16, N. Y.

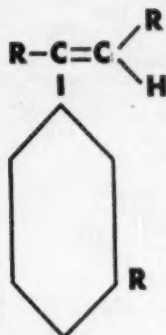
INDUSTRIAL  
CHEMICALS

## CW Report

COMPANY	CHEMICAL NAME	GRADE	SPECIFIC GRAVITY OR DENSITY	PRICE (\$/LB.)	MAJOR USES
E. I. du Pont de Nemours & Co.	tetrafluoroethylene (Teflon 30)	—	2.10-2.20	7.00-7.75	chemical, electrical, non-adhesive, lubrication, mechanical
	" (Teflon 6)	—	2.10-2.20	9.50	tape, tubing, wire insulation, hose, gasket stock, tape-wrapped insulation, etc.
	" (Teflon 1)	—	2.10-2.20	5.10-5.75	gaskets, valve 7 pump packings, spacers for coaxial cables, inserts for coaxial connectors, nonadhesives, coverings
	" (Teflon 5)	—	2.10	5.35-6.00	valve bodies, agitators, electric range wire, motor bearings, rubber molds calender guides, insulator bushings
M. W. Kellogg Co.	trifluorochloroethylene (Kel-F)	—	2.10	8.50-11.00	high-temperature applications where electrical and corrosion-resistant properties are required

## Phenolics

Bakelite Co., Div. U.C.C.	phenolics	—	—	—	—
Barrett Div. Allied Chemical & Dye Corp.	phenolic resins (Plaskon)	—	—	—	molding compounds
Booty Resineers, Inc.	liquid phenolics	varnish	1.135	—	paper impregnating
	"	coatings	1.225	—	abrasives coatings
The Borden Co., Chem. Div.	phenol formaldehyde	liquid and powdered adhesives	1.20	0.17-0.30	adhesives and impregnants
	resorcinol formaldehyde	liquid adhesives	1.20	0.30-0.75	adhesives
Catalin Corp. of America	phenol formaldehyde resins	—	—	—	wood adhesives
	resorcinol resins	—	—	—	"
	phenolic resins	—	—	—	laminating, bonding, impregnating
Dusez Plastics Div. Hooker Electrochemical Co.	phenolic molding compound	general purpose	1.38	0.195-0.20	variety of molded article
	" (265 Black)	"	1.37	0.191-0.20	"
	" (791 Black)	"	1.37	0.245-0.25	"
	" (1544 Black)	high impact	1.37	0.625-0.63	"
	" (16221 Natural)	"	1.25	0.42-0.425	"
	" (15634 Black)	"	1.75	0.305-0.31	"
	" (16274 Natural)	electrical	1.31	0.295-0.30	"
	" (16694 Green)	"	1.57	0.195-0.205	"
	" (1308 Black)	heat resistant	1.54	0.195-0.205	"
	" (14893 Black)	"	1.38	0.195-0.20	caps, closures, etc.
	" (3949 Black)	minimum bleed	1.29	0.365-0.37	molded articles
	" (16840 Black)	impact	1.85	0.830	heat-resistant parts, electrical bases
Fiberite Corp.	phenolic-asbestos-yarn-reinforced	high impact	1.09	0.395	electrical bases, gears, casters, sheaves, bushings, terminal strips
	phenolic-cotton-fabric-reinforced	"	1.38	0.380	electrical-mechanical bases, handles, housings
	phenolic-cellulose-reinforced	"	1.39	0.670	handles, gunstocks, containers, housings, gears
	phenolic-cotton-cord-reinforced	"	1.39	0.395	electrical-mechanical housings, gears, bushings, bearings, handles
	phenolic-cotton-fabric-reinforced	"	1.70	1.07	heat-resistant parts, electrical bases, flashlights
	phenolic-asbestos-yarn-reinforced	"	1.75	0.63	very high heat-resistant parts, foundry driers, electrode holders racket and guided missile parts
	phenolic-glass-reinforced	"			



# PICCOLASTIC RESINS

*24 standard grades—polymers of styrene  
and its homologues*

Piccolastic Resins are made in five series and twenty-four standard grades. They are polymers, in a wide range of average molecular weights, of styrene and its homologues.

They possess sufficient pale color so as to be suitable for the majority of uses. The entire line is soluble in aromatic hydrocarbons.

The Piccolastic Resins, with the exception of one type, are wholly hydrocarbon in structure, and therefore are alkali and acid resistant to a high degree, do not support mold or other fungus growth, and are not subject to enzyme reaction.

The Piccolastic Resins are permanently thermoplastic, and because of their heat stability at temperatures up to at least 175 C, make excellent stable, hot melt compounds.

Piccolastic Resins vary from viscous liquids through tacky solids, brittle solids to resins of hard horny toughness. Inter-mixtures of the various items permit an unlimited range of properties.



**Pennsylvania Industrial Chemical Corp.**

Clairton, Pennsylvania

Plants at

Clairton, Pa., West Elizabeth, Pa., and Chester, Pa.

District Sales Offices

New York, Chicago, Philadelphia,  
Pittsburgh, Detroit



Pennsylvania Industrial Chemical Corp.  
Clairton, Pennsylvania

Please send bulletin and samples of Piccolastic Resins for  
(application) \_\_\_\_\_

Name \_\_\_\_\_ Position \_\_\_\_\_

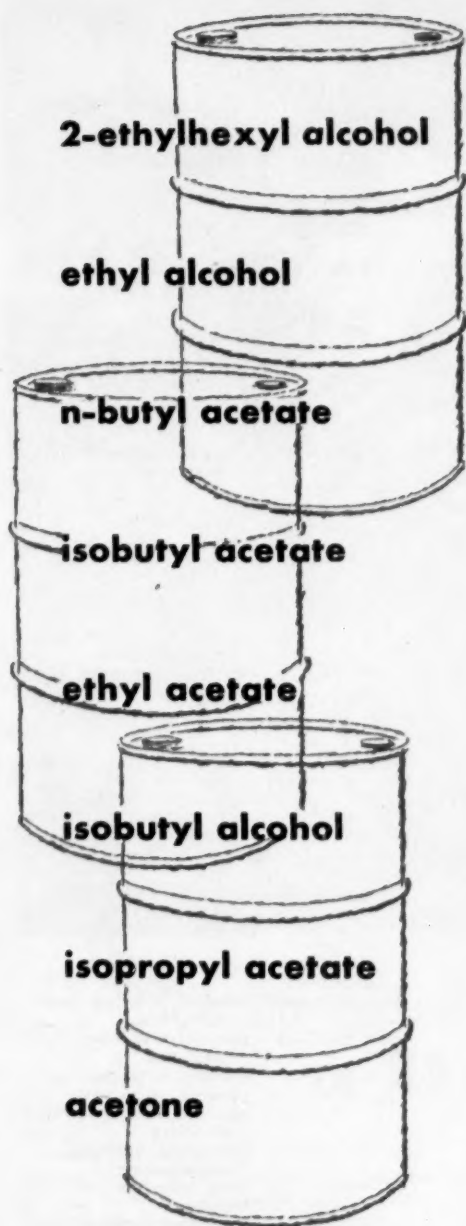
Company \_\_\_\_\_

Address \_\_\_\_\_

# CW Report

COMPANY	CHEMICAL NAME	GRADE	SPECIFIC GRAVITY OR DENSITY	PRICE (\$/LB.)	MAJOR USES
Fiberite Corp.	phenolic-cotton-cord-reinforced	"	1.39	0.95	parts requiring very high mechanical strength and light weight
General Elec. Co. Chemical Materials Dept.	phenolic	heat resistant	1.65	0.195	utensil handles
	rubber-phenolic	general purpose	1.30	0.355	molded parts requiring good resilience
	phenolic	improved impact	1.38	0.297	high-strength molded parts
	"	general purpose molding compound	1.37	0.195	miscellaneous phenolic molded parts
	" (GE-12316)	foundry	1.20	0.307	shell molding
	" (GE-12392)	"	1.20	0.27	"
	" (GE-12353)	"	1.20	0.23	foundry core making
Heresite & Chem. Co.	phenolic	chemical resistant	1.29	—	special items requiring high chemical resistance
International Textile	phenolic molding compound	high impact	—	0.32-0.50	special impact applications
Ironsides Resins Inc.	phenolic (CT 202)	—	1.115	0.187	adhesive sheet cigarette-proof aluminum decorative laminate
	" (P-190Y)	—	1.605	0.305	chemical-resistant laminates
	" (101)	—	1.165	—	high heat resistance, for glass and asbestos laminates
	" (87A)	—	1.030	0.212	adhesive sheet cigarette-proof aluminum decorative laminate
Knoedler Chem'l Co.	phenol formaldehyde cast resin	—	approx: 1.30	0.55-0.65	umbrella and other handles, games
Lebec Chemical Corp.	phenol-formaldehyde	foaming	1.20-1.22	0.40	insulating foams
	"	general purpose	1.05-1.11	0.145	laminates
	"	core stock	1.02-1.04	0.14	core stock for decorative laminates
	"	electrical	1.03-1.045	0.17-0.19	electrical grade laminates
	"	"	1.05-1.11	0.20	"
	"	post forming	1.05-1.11	0.18	postforming laminates
	"	casting	1.20-1.25	0.45	phenolic castings
	"	foundry binder	1.09-1.10	0.245	cores for metal castings
	"	adhesive	1.10-1.11	0.35	adhesives
Loven Chemical	phenol formaldehyde	medium impact	1.39	0.257	electrical boxes, ammeters, pyrometers
	"	general purpose	1.39	0.195	iron handles
	"	high impact	1.22	0.65	—
	"	"	1.38	0.40	—
	"	general purpose	1.40	0.195	electrical switches, wiring devices
	"	"	1.40	0.205	toys
	"	heat resistant	1.65	0.23	appliance handles
	"	chemical resistant	1.40	0.26	photographic trays, tanks
	"	general purpose	1.39	0.23	radio cabinets
	"	heat resistant	1.70	0.65	appliance handles
The Marblette Corp.	phenolic resins	casting	1.25	0.50-0.60	tooling molds
	"	"	1.20	0.46	coating wood, metal cements, laminating purpose
	"	bonding	1.20	0.46	"
Monsanto Chem. Co.	phenolic	general purpose	1.36-1.43	0.19	wiring devices, housings
	"	electrical	1.66-1.82	0.30-0.35	connectors, tube bases, capacitors, electronics
	"	heat resistant	1.60-1.65	0.19	pot handles
National Casein Co.	phenol-formaldehyde	adhesive	9.4 lbs./gal.	0.18	plywood adhesive
Pitt-Consol Chemical Co.	phenol-formaldehyde	heat-resistant	1.61-1.68	0.19-0.21	heater plugs, pot handles
	"	improved impact	0.36	0.245	spindles, casters
	"	general purpose	1.36-1.41	0.19-0.21	electrical parts, bottle caps
Plastics Engrg. Co.	phenolic molding compound	semi-impact	1.36	0.245*	industrial applications
	"	general purpose	1.36	0.195*	"
	"	closure compound	1.38	0.195*	bottle caps
	"	heat resistant	1.55	0.195*	compression or transfer
	phenolic resins	foundry	—	0.27*	shell molding
	"	bonding	—	0.29*	bonding foundry shells
	phenolic molding compound	mottles	1.38	0.205*	radio and TV housings

\*Qualified.



**Eastman**

CHEMICAL PRODUCTS, INC.

Kingsport, Tennessee

subsidiary of EASTMAN KODAK COMPANY



## Eastman solvents

These products are stored in bulk in the major industrial centers of the United States. For further information, write or call your nearest Eastman representative.

**SALES OFFICES:** Eastman Chemical Products, Inc., Kingsport, Tenn.; New York—260 Madison Ave.; Framingham, Mass.—65 Concord St.; Cincinnati—Carew Tower; Cleveland—Terminal Tower Bldg.; Chicago—360 Michigan Ave.; Houston—412 Main St.; St. Louis—Continental Bldg. **West Coast:** Wilson Meyer Co., San Francisco—333 Montgomery St.; Los Angeles—4800 District Blvd.; Portland—520 S. W. Sixth Ave.; Salt Lake City—73 S. Main St.; Seattle—821 Second Ave.

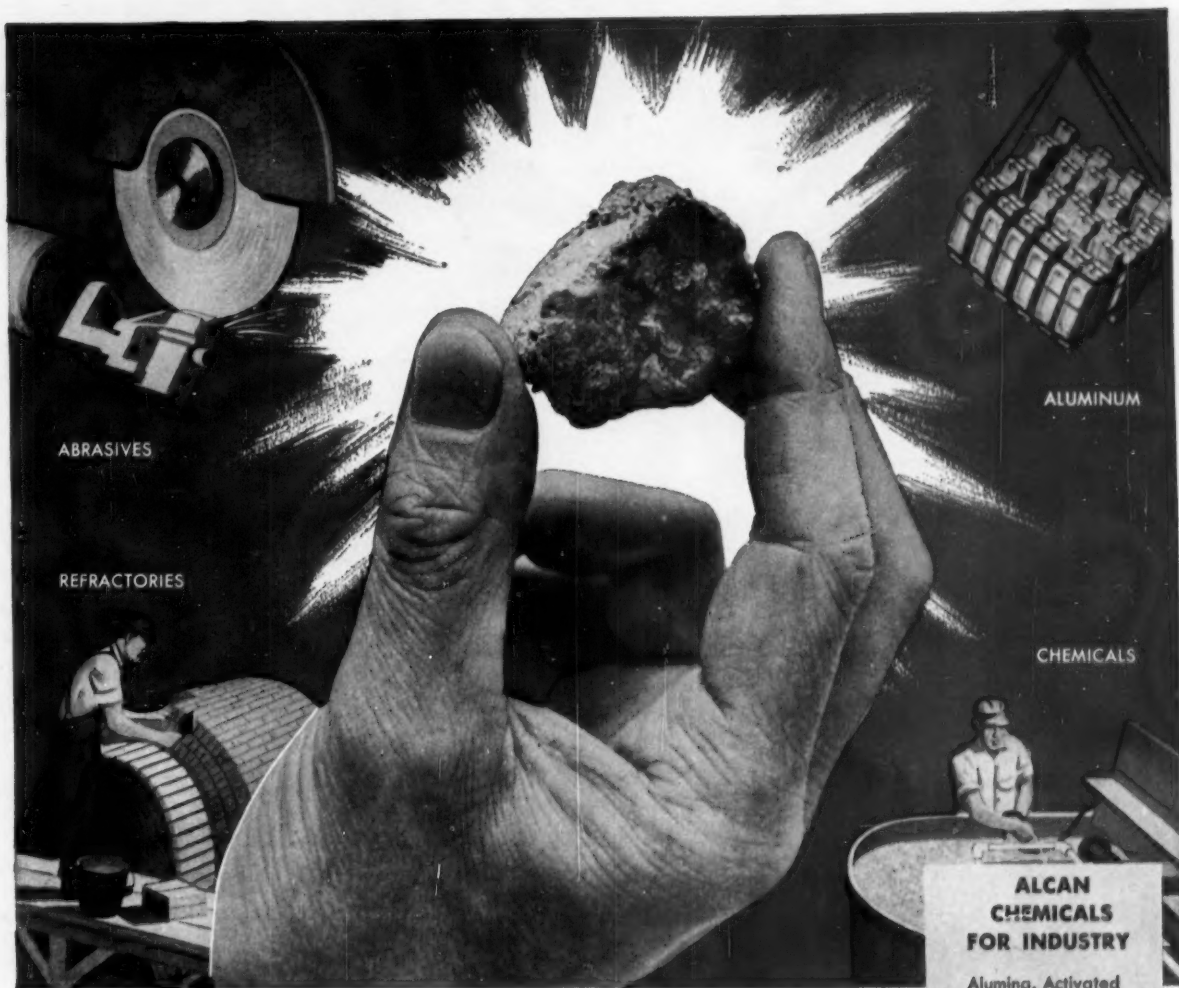
## CW Report

COMPANY	CHEMICAL NAME	GRADE	SPECIFIC GRAVITY OR DENSITY	PRICE (\$/LB.)	MAJOR USES
Plastics Engrg. Co.	phenolic resins	laminating varnish	—	0.168*	industrial laminates
	phenolic molding compound	electrical insulating	1.89	0.305*	electrical parts
Rezolin, Inc.	foaming phenolic (Corfoam 114)	high impact	3-21 lbs. per cu.ft.	0.55*	tooling
	phenolic resin (R-72S)	"	1.26	0.49*	"
Rogers Corp.	fiber-reinforced phenolic nodular molding materials	medium to high impact	1.37-1.75	0.28-0.60	industrial parts of various types
	fiber-reinforced phenolic sheet molding materials	high impact, electrical, mechanical	1.37-1.75	0.45-0.85	heavy-duty industrial electrical and mechanical parts
Synvar Corp.	phenolic molding compound (Synvar PM-6444E/3 Brown)	general purpose	1.39	0.195-0.205	electrical appliances
	phenolic compounding resin (Synvarite PNL-156HL/24)	—	1.27	0.292-0.312	compounding of wood waste
	phenolic molding compound (Synvar PM-86516 Blk.)	medium impact	1.35-1.37	0.242-0.252	—
	" (Synvar PM-6512M)	general purpose	1.35-1.37	0.195-0.205	electrical appliances
	" (Synvar PM-6599/9 Blk.)	"	1.35	0.195-0.205	radios, televisions, electrical appliances
Watertown Mfg. Co.	phenol-formaldehyde	general purpose	1.43	0.195	electrical appliances
	"	medium impact	1.36	0.245	—

## Amino Plastics

Barrett Div. Allied Chemical & Dye Corp.	urea molding compound (Plaskon)	housing	1.47-1.52	—	large housings, toilet seats
	"	standard	"	—	appliance housings, buttons, handles, knobs
	melamine molding compound (Plaskon)	—	"	—	dinnerware, buttons, cutlery handles
American Cyanamid Co.	urea molding material	—	—	0.33-0.515	radio housings, wiring devices, closures
	melamine molding material	—	—	0.47-0.67	buttons, dinnerware
	urea adhesive resins	powders	—	0.205	plywood, furniture
	melamine-urea adhesives	liquids	—	0.07-0.095	"
	melamine laminating resins	powders	—	0.25-0.28	plywood, sporting equipment, boats
Boott Resineers	urea-borates liquid adhesive	"	—	0.45-0.465	decorative and industrial laminates
	urea-formaldehyde	water soluble adhesive	1.22	0.20	bonding, impregnating plywood, wood waste
The Borden Co., Chem. Div.	melamine resins	—	—	—	plywood adhesives, paper additives
Catalin Corp. of America	urea resins	—	—	—	laminating, bonding, impregnating wood adhesives
	urea-formaldehyde compounds	alpha-filled	—	—	buttons
George Morrell Corp.	urea-formaldehyde compounds	—	—	0.33	caps and closures, electrical wiring devices
Lebec Chemical Melamine Plastics	urea-formaldehyde	foundry binder	1.168-1.171	0.145	cores for metal castings
	melamine-cotton-fabric-reinforced	high impact	1.55	0.57-0.67	dishware, terminal strips, trays, electrical parts
	melamine-glass-reinforced	"	1.90	0.95	electrical parts requiring arc resistance
National Casein Co.	urea-formaldehyde (DR)	powder adhesive	—	0.20	plywood adhesive
	" (#750)	adhesive	—	—	"
Onyx Oil & Chem. Co.	urea-formaldehyde resin (NCF paste)	—	10.6 lbs./gal.	0.095*	textiles, shrink- and crush-proofing
	urea-formaldehyde resin (Liquid Resin SS)	—	—	—	textiles, adhesives
	modified formaldehyde-type resin (CET)	—	—	—	textiles, shrinkproof
	biguanidine-formaldehyde resin (Xynofix FL)	—	—	—	textiles, dye assistant

\*Qualified.



## How up-to-date are you on **Bauxite?**

**I**N ADDITION to being the raw material foundation of the aluminum industry, bauxite and its derivative chemicals also have important applications in other industries.

Bauxite and alumina, for example, are used in the manufacture of grinding wheels, abrasive stones, abrasive cloths and papers. The refractory industry uses them for making bricks to stand up under extreme high temperatures. Alumina is also an ingredient of spark plugs, vitreous enamels and glazes. It is used as a filler material in composite flooring . . . for removing moisture from the air in the control of humidity . . . for elec-

trical and laboratory porcelain . . . as a catalyst in many chemical reactions.

Other chemicals derived from bauxite are used in such industries as: paper and pulp, textile, rubber, pharmaceutical, petroleum, chemical and allied industries.

Aluminium Limited, producer of one-fourth of the free world's aluminum, is able to supply bauxite and its associated chemicals to other industries. We will be glad to furnish you with information on the various grades and types available. Write to Aluminium Limited Sales, Inc., 630 Fifth Avenue, New York 20, N. Y.

### ALCAN CHEMICALS FOR INDUSTRY

Alumina, Activated  
Alumina, Calcined  
Alumina Hydrate  
Aluminum Chloride,  
Anhydrous  
Aluminum Fluoride  
Aluminum Sulphate  
Aluminum Super Purity  
99.990% min. pur.  
Bauxite  
Chlorine, Liquid  
Cryolite, Artificial  
Fluorspar  
Lime  
Magnesia  
Magnesium Chloride,  
Anhydrous  
Sodium Fluoride  
Sulphuric Acid

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**Aluminum Chemicals**

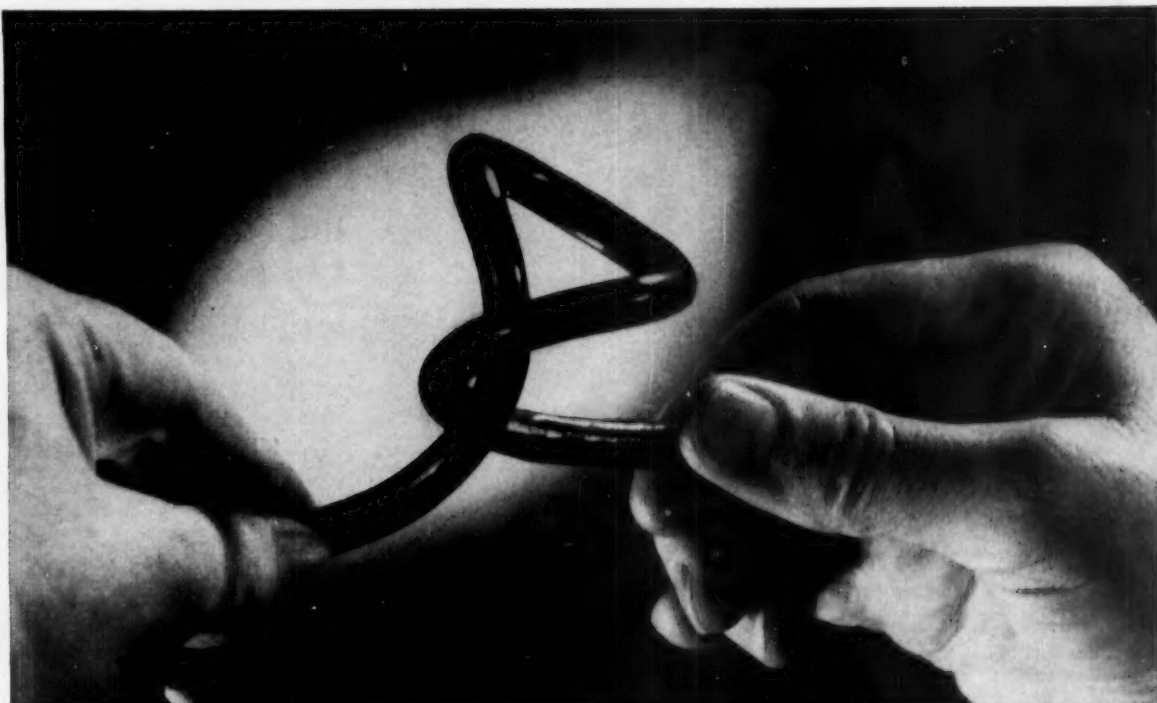
## CW Report

COMPANY	CHEMICAL NAME	GRADE	SPECIFIC GRAVITY OR DENSITY	PRICE (\$/LB.)	MAJOR USES
Onyx Oil & Chem. Co.	modified urea-formaldehyde condensate (Resin G-36)	—	—	—	textiles
Sylvan Plastics, Inc.	urea-formaldehyde molding compound	—	—	0.33	buttons, closures, electric wiring devices
	urea-formaldehyde-cellulose-filled	powder colors	1.45-1.50	0.29-0.30	buttons, wiring devices, closures
	"	granular colors	1.45-1.50	0.32-0.33	"
Woonsocket Color & Chemical	specific or mixed ethers of alicyclic urea-formaldehyde	—	1.111-1.199	0.20	paper or textile coating compounds, adhesives and binders
	butylated urea-formaldehyde	—	0.975-0.005	0.335	paper and metal coatings

## Polyesters

Allied Chemical & Dye Corp.	alkyd molding compounds (Plaskon)	mineral-filled	2.22-2.24	—	electronic and electrical applications
	"	putty	"	—	"
	polyester resins—(Plaskon)	glass-reinforced	2.00-2.08 1.20-1.37	—	translucent panels, furniture, car and truck bodies
American Cyanamid Co.	polyester resins	—	1.10-0.02	0.35-0.40	structural sheeting, boats
Archer-Daniels-Midland Co.	polyester (Aropol 7200)	rigid, flame resistant	1.31	0.43*	fire-resistant electrical parts and laminates
	" (Aropol 7120)	rigid, air curing	1.15	0.35*	boat coverings, large surface areas such as tanks, radomes
	" (Aropol 7110)	rigid, general purpose	1.15	0.35*	boats, water tanks, tote boxes, electrical components, safety helmets, corrugated sheeting
	" (Aropol 7100)	"	1.20	0.35*	aircraft parts, industrial housings, electrical components
	" (Aropol 7300)	flexible	1.11	0.47*	impart flexibility and toughness to the rigid polyesters
Atlas Powder Co.	solid polyester (Atlas FP)	flame resistant	—	0.66-0.69	"Prepreg," "Premix," fiberglass laminates
	" (Atlas 382)	chemical resistant	—	0.57-0.60	"Prepreg," "Premix," tanks, ducts
	" (Atlas 363)	binder for glass fibers	—	0.63-0.65	manufacture of glass-reinforcing mat
Bakelite Co., Div. U.C.C.	polyesters	—	—	—	—
Booty Resineers, Inc. Celanese Corp. of Amer.	polyester emulsions	water dispersed	—	0.48	preforms, coatings
	styrene-type polyester (MR-28C)	general-purpose rigid	1.12	0.33	boat hulls, auto truck bodies, fishing rods, aircraft parts
	" (MR-30C)	general-purpose flexible	1.07	0.44	blending with rigid resin
	" (MR-31C)	low-exotherm rigid	1.13	0.37	novelty castings, jewelry
	" (MR-33C)	self-extinguishing	1.27	0.53	electrical laminates, fire-resistant laminates
	" (MR-37CX)	fast-curing rigid	1.12	0.33	boat hulls, tanks, coatings
	" (MR-37RL)	light-stabilized	1.15	0.355	corrugated and flat translucent sheets
	" (MR-40R)	high-reactivity rigid	1.08	0.38	premix compounds
	" (MR-41R)	high-reactivity resilient	1.10	0.36	boxes, trays, housings, signs
	" (Marcothix 1)	thixotropic, rigid	—	0.50	large structures, coatings
	" (Marcothix 7)	thixotropic, resilient	1.205	0.46	boat covering, large structures

\*Qualified.

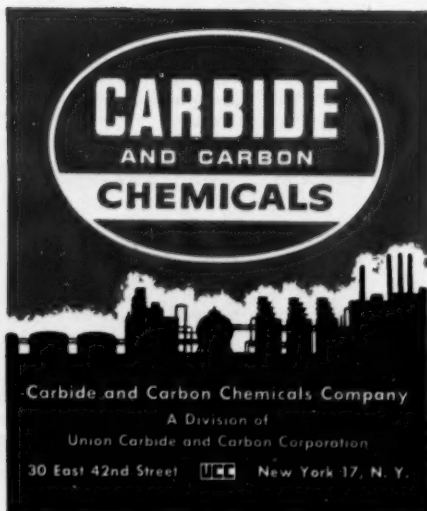


## Use CARBIDE'S Primary Decyl Alcohols

*if you're looking for*

LOW VOLATILITY  
EXCELLENT ELECTRICAL PROPERTIES  
HEAT AND LIGHT STABILITY  
GOOD LOW-TEMPERATURE PROPERTIES  
RESISTANCE TO WATER EXTRACTION

## in your Plasticizers



Top quality plasticizers made from primary decyl alcohols impart all these properties to vinyl and other synthetic resins. Primary decyl alcohols has been developed by CARBIDE as a high purity raw material for the manufacture of improved plasticizers. This product is now available in tank car quantities.

The specifications given below will help you evaluate primary decyl alcohols as a preferred intermediate for your plasticizers.

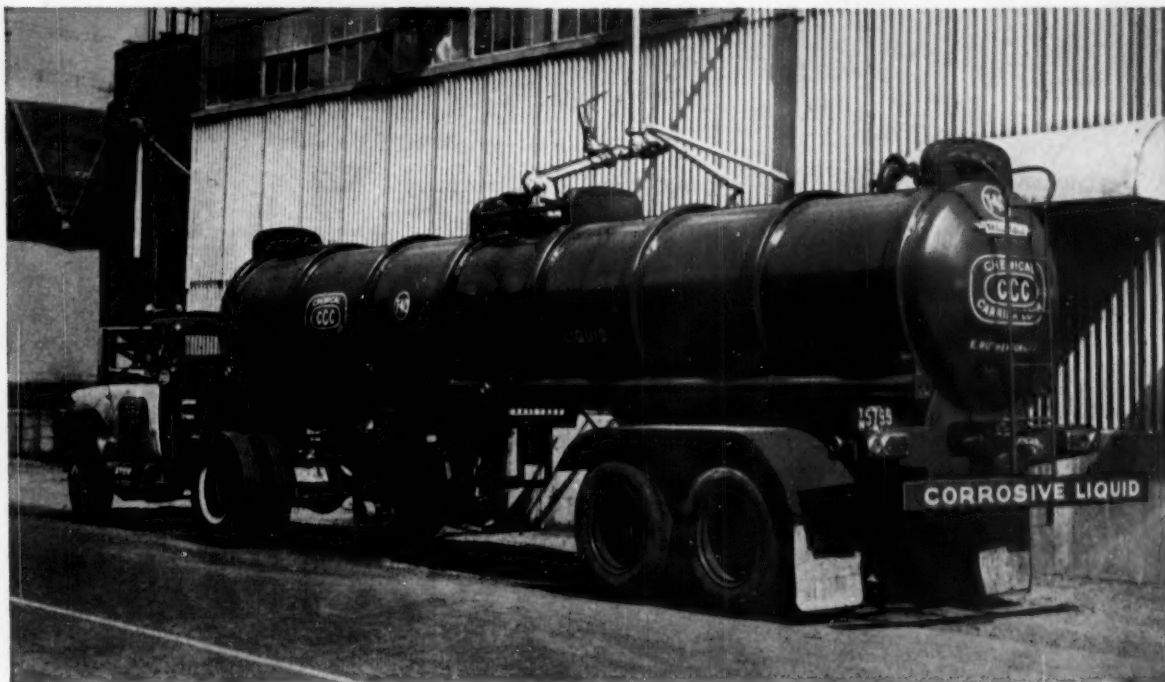
Distillation, 760 mm.....	215 to 225°C.
Primary Decyl Alcohols, min.....	98.0% by wt.
Aldehydes, max.....	0.20% by wt. as decanal
Acidity, max.....	0.002% by wt. as acetic acid
Color (Pt.-Co. Scale).....	15

For samples or further information on this new, high purity, low-volatile plasticizer intermediate, call or write the CARBIDE office nearest you. In Canada: Carbide Chemicals Company, Division of Union Carbide Canada Limited, Montreal and Toronto.

# CW Report

COMPANY	CHEMICAL NAME	GRADE	SPECIFIC GRAVITY OR DENSITY	PRICE (\$/LB.)	MAJOR USES
Chemical Process Co.	polyester resins (Duolite)	—	—	0.35	boats, translucent reinforced panels
	polyester coating resins	—	—	0.49	fast setting, impact-resistant gel, coat resin, clear and colored
Columbia-Southern Chem. Corp.	allyl diglycol carbonate	water-white clear	1.143	0.75*	optical lenses, aircraft windows, optical cement, laminates
General Electric Co., Chemical Materials Dept.	polyester (AR403)	rigid	—	0.35	boats, housings, laminates
General Tire & Rubber	polyester-o-styrene (Glykon F700)	flexible	1.22	0.60	automotive parts, castings
	polyester 30% styrene (Glykon R300)	rigid-medium activity	1.14	0.35	automotive parts, signs, panels, housings "guns"
Glaskyd, Inc.	polyester (Glaskyd 1902)	high strength	2.10	0.70	—
	" (Glaskyd 1901)	general purpose	2.20	0.40	—
	" (Glaskyd 2001)	self-extinguishing	2.40	0.46	—
The Glidden Co.	polyester (Gliopol 1017)	high heat distortion chemical resistant	1.14	—	fume ducts, tanks
	" (Gliopol 1001)	general purpose	1.12	—	fiberglass, appliance parts, aircraft applications, signs, boats, manikins, etc.
	" (Gliopol 1015A)	—	1.10	—	—
	" (Gliopol 3000 series)	pigment concentrates	—	—	for molding and laminating
	" (Gliopol 2000 series)	flexible	—	—	high impact
Hooker Electrochemical Co.	polyester	fire resistant	1.34	0.43-0.485	building, automotive electrical board, boats, aircraft
Interchemical Corp.	styrene-type polyester (IC312 Std)	all-purpose rigid	1.148	0.35*	electrical sheets—decorative laminates, molded parts, etc.
	" (IC548)	light—stable rigid	1.148	0.365*	corrugated skylights
	" (IC548)	rigid-fast curing	1.15	0.35*	glass-reinforced, molded parts
	" (IC625)	full rigid chemical resistant	1.14	0.35*	boats, tanks, glass-reinforced molded parts, etc.
	" (IC401)	full flexible	1.06	0.44*	for blending with rigid reams to make resilient reams
	" (IC730)	semirigid	1.12	0.35*	flat sheets, trays, boxes, etc.
	" (IC636FR)	fire resistant	1.28	0.48*	where fire resistance is important
	antimony concentrate (IC776)	additive	2.84	0.495*	fire resistance
	toluene-type polyester (IC671)	rigid	1.147	0.405*	casting, etc., as a premix compound ream
	polyester-filled phthalate monomer type (IC638 DAP)	"	1.28	0.55*	as a premix compound ream
Luminous Resins, Inc.	luminous polyester paste	reinforced plastic fiberglass	—	—	sheets
Mess Plastics Co.	diallyl phthalate (Diall 51-01)	dimensional stable	1.65	0.76	electrical connectors
	fiberglass diallyl phthalate (Diall 52-20-30)	high impact	1.60	1.30	electrical components
	" (Diall 52-01)	low-loss and dimensional stable	1.59	1.88	precision components
	Dacron-filled diallyl phthalate (Diall 50-51)	"	1.59	1.88	"
	"	moisture- and impact resistant	1.20	3.50	electronic components
	Orlon-filled diallyl phthalate (Diall 50-01)	moisture resistant	1.24	2.75	"

\*Qualified.



## KEL-F® dispersion-coated tank truck transports corrosive chemicals



**BAKE OVEN** at Kellogg Plant, Jersey City, N. J. Overall length 85 ft., width 12 ft., height 12 ft., iso-thermal control,  $\pm 5^\circ\text{F}$ . This new Kellogg oven is being used to develop improved techniques for large area applications.



**QUENCHING**—After final baking, tank is quenched to produce tough, transparent, flexible coating.

This tank, which is designed to transport corrosive chemicals without danger of contamination of the final product, was spray coated with KEL-F Dispersions at the Kellogg plant in Jersey City, and baked-fused in a specially built oven large enough to complete each coating in a single operation. Preliminary tests were carried out with a slightly smaller tank, and the correct techniques developed before proceeding with the coating operations on the tank truck.

### KEL-F DISPERSIONS—NEW WEAPON IN FIGHT AGAINST CORROSION

KEL-F Dispersions are finely divided fluorocarbon plastic solids in a volatile medium. Applied by spray, dip or spread coating, they are fused by heat into a tough, impervious coating—firmly bonded to the surface on which applied, and providing a chemical and temperature resistant surface that is anti-sticking and self-cleaning.

This liquid chemical carrier is evidence that the range of applications for KEL-F Dispersions is not limited by size, and that present techniques of dispersion coating can be applied to tanks and other outside equipment. There are experienced applicators of KEL-F Dispersions, serving nearly every major industrial area. They can show you how this fluorocarbon polymer can come to your aid in your fight against corrosion and high processing temperatures. For more information, send for KEL-F Dispersion Manual, and list of applicators.



**THE M. W. KELLOGG COMPANY**  
Chemical Manufacturing Division, P. O. Box 469, Jersey City, N. J.  
SUBSIDIARY OF PULLMAN INCORPORATED

® Registered trademark of The M. W. Kellogg Company's fluorocarbon polymers

# CW Report

COMPANY	CHEMICAL NAME	GRADE	SPECIFIC GRAVITY OR DENSITY	PRICE (\$/LB.)	MAJOR USES
Mol-Res Corp.	polyester	general purpose	1.12	0.34	boats, radomes, containers'
	(Pleogen 1000)				laminates of all types
	" (Pleogen 1200)	casting resin	1.12	0.40	embedments, toys, bio-
	" (Pleogen 1300)	molding	1.14	0.34	logical specimens
	" (Pleogen 1402)	flexible resin	1.08	0.43	continuous laminates, cor-
	" (Pleogen 1600)	low-cost general purpose	1.13	0.30	rugated paneling
	" (Pleogen 1700)	high viscosity	1.16	0.36	blending with rigid resins to give flexibility
George Morrell Corp.	" (Pleogen 1800)	thixotropic	1.14	0.44	general purpose
	polyester-sisal-filled	—	1.50	—	continuous laminates
	polyester-glass-filled premix	high strength	1.80-2.00	—	compression
	alkyds-glass-filled	"	1.80-2.00	—	custom molding appli-
Morton-Withers Chem. Co.	polyester	—	—	0.60-0.61	ances, electrical parts
	(MoresterX-939)	—	—	0.60-0.61	electrical parts, appli-
	" (MoresterX-905)	—	—	0.65-0.66	ances, etc.
	" (MoresterX-906)	—	—	0.80-0.81	polyurethane foams
Naugatuck Chemical Div. U. S. Rubber Co.	" (MoresterX-942)	—	—	0.80-0.81	"
	polyester	all types	1.20	0.34-0.60	polyurethane flexible foams
	(Vibrin)				polyurethane solid rubbers and semirigid foams
					glass-reinforced plastics
Ohio-Apex-Div. F.M.C.	diallyl phthalate prepolymer (Dapon)	—	—	0.90	electronic parts, construction materials
Onyx Oil & Chem. Co.	polyester solution (Xynotaf WS)	—	—	—	textiles
	modified polyester solution (Ribbon Finish R)	—	—	—	"
Pittsburgh Plate Glass Co.	polyester	liquids	1.12-1.30	0.35	furniture, aircraft and automotive parts, clear castings
	"	"	1.12-1.30	0.35*	"
Reichhold Chemicals, Inc.	polyester	—	1.13	0.34	laminating, matched meta die, molding, casting
	(Polylite 8000)	—			large structural lay-up,
	" (Polylite 8001)	—	1.125-1.135	0.34	bag molding, vacuum molding, casting
	" (Polylite 8016)	—	1.157	0.365	corrugated and flat sheets and translucent and opaque products requiring maximum light stability
	" (Polylite 8150)	—	1.01	0.44	impregnating, encapsulating, modifying rigid polylite resins
	" (Polylite 8170)	—	1.257	0.37	press molding, laminating, casting
	" (Polylite 8037)	—	1.106-1.116	0.33	boat hull and deck surfacing, coating wood and concrete floors and walls, and tanks and vats
	" (Polylite 8237)	—	1.106-1.116	0.37	"
H. H. Robertson Co.	polyester	electrical	1.410	—	electrical equipment
	(Stypol 502E)				
	" (Stypol 507E)	electrical, heat resistant	1.358	—	electrical
	" (Stypol 207E)	electrical, thermal	1.615	—	"
	"(Stypol 124-E-50)	flexible, electrical	0.977	—	electrical equipment
	" (Stypol 602E)	heat resistant	1.43	—	encapsulating electrical equipment

\*Qualified.



**BLOCKSON**

# sodium phosphates

**Sodium  
Tripolyphosphate**

**Trisodium  
Phosphate**

CRYSTALLINE  
MONOHYDRATE

**Tetrasodium  
Pyrophosphate**

ANHYDROUS

**Sodium  
Polyphos**

(SODIUM  
HEXAMETAPHOSPHATE)

(SODIUM  
TETRAPHOSPHATE)

SODIUM ACID PYROPHOSPHATE  
TRISODIUM PHOSPHATE CHLORINATED  
DISODIUM PHOSPHATE  
ANHYDROUS • CRYSTALLINE  
MONOSODIUM PHOSPHATE  
ANHYDROUS • MONOHYDRATE

*Blockson is also a major producer of...*

SULFURIC ACID  
SODIUM FLUORIDE  
SODIUM SILICOFUORIDE  
HYGRADE FERTILIZER  
NONIONIC SURFACTANT-TEOX 120

**BLOCKSON CHEMICAL COMPANY**

Division of Olin Mathieson Chemical Corporation  
Joliet, Illinois

## CW Report

COMPANY	CHEMICAL NAME	GRADE	SPECIFIC GRAVITY OR DENSITY	PRICE (\$/LB.)	MAJOR USES
H. H. Robertson Co.	polyester	electrical	1.143	—	impregnating electrical equipment
	(Stypol 107E)				
	" (Stypol 100-S)	transparent, wetting of fibers, light-stable	1.105	—	sheets and panels
	" (Stypol 705)	rigid, medium heat distortion	1.067	—	laminating and molding
	" (Stypol 407)	rigid, high heat distortion	1.147	—	"
	" (Stypol 405 and 405-S)	rigid, light-stable	1.140	—	glass-reinforced molding laminating
	" (Stypol 25)	rigid, high heat distortion	1.182	—	glass-reinforced molding laminating
Rohm & Haas Co.	" (Stypol 12)	flexible	1.14	—	laminates, flexible additive
	unsaturated polyester dissolved in monomeric styrene (Paraplex P-47)	resilient	1.099	0.38*	fabrication of reinforced plastics
	" (Paraplex P-49)	rigid	1.098	0.37*	"
	" (Paraplex P-433)	light-stabilized	1.162	0.365*	"
	unsaturated polyester dissolved in monomeric methyl methacrylate (Paraplex P-444)	"	1.183	0.38*	"
	unsaturated polyester dissolved in monomeric styrene (Paraplex P-43)	rigid	1.148	0.34*	"
	" (Paraplex P-13)	flexible	1.02	0.47*	"
Specialty Resins Co.	" (Paraplex rigid P-43HV)		1.18	0.37*	"
	polyester (R-120)	—	9.42 lbs./gal.	—	aircraft parts, boats, corrugated sheets
Thermaflow Chem. Corp.	" (L-2894)	—	9.40 lbs./gal.	0.355*	tanks, boats, trays, etc.
	polyester-glass-reinforced	extremely high impact	1.80	0.64	heavy-duty electrical appliance, automotive housings for business machines, agitators
John H. Witte & Sons	polyester-nylon-rag-reinforced	high impact	1.50	0.39	
	alkyd resins	—	—	—	

## Polyurethanes

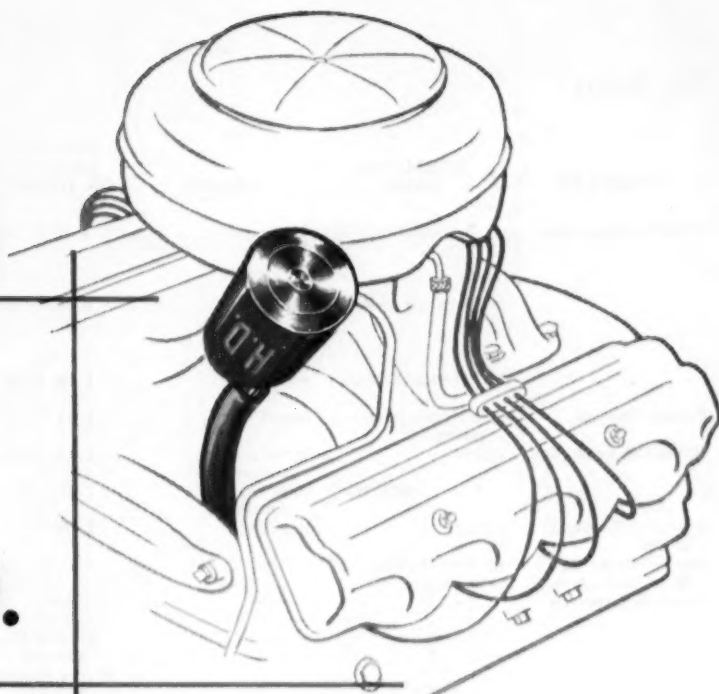
Nopco Chemical Co.	polyisocyanate mixed polymers (Lock-foam Series)	—	2-30 lbs./cu. ft.	2.75-3.00*	structural components in aircraft, core material for fabricating radomes, buoyant fillings, packaging, etc.
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## Epoxy Resins

Bakelite Co. Div. Union Carbide & Carbon Corp.	epoxies	—	—	—	—
The Borden Co., Chem. Div.	epoxide resins	fluid-low molecular wt.	1.2	0.80-1.10	metal-to-metal adhesive tools, high-strength laminates
Ciba Company, Inc.	epoxy (Araldite 502)	liquid	1.12-1.18	0.80*	tooling, laminating, encapsulating, adhesive formulations
	" (Araldite 504)	"	1.13-1.14	0.77*	"
	" (Araldite 6010)	"	1.16-1.18	0.80*	tooling, laminating, encapsulating, coatings, adhesives, formulations, vinyl stabilizers
	" (Araldite 6020)	"	1.16-1.18	0.80*	tooling, laminating, encapsulating, coatings, adhesives formulations

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## CW Report

COMPANY	CHEMICAL NAME	GRADE	SPECIFIC GRAVITY OR DENSITY	PRICE (\$/LB.)	MAJOR USES
Ciba Company Inc.	" (Araldite 6030)	—	1.16-1.18	0.85 1/5*	adhesive, coatings and laminating formulations, and vinyl stabilizers
	" (Araldite 6040)	liquid	1.16-1.18	0.855*	coatings, adhesive, and laminating formulations, and vinyl stabilizers
	" (Araldite 6060)	solid	1.18-1.20	0.75*	laminating, encapsulating, adhesives formulations
Farane Plastics	epoxy resin compound	liquid	1.22	1.00-1.33	adhesives, coatings, laminating
Houghton Labs., Inc.	epoxy	hysol potting compounds	1.12-1.75	0.80-25.0	electrical insulation
	" (6000 HD)	high heat distortion flexible	1.27	2.30	"
Irvington Division of 3M	epoxy	—	1.00	—	encapsulation of coils
Jones-Dabney Co., Subsidiary of Devco & Raynolds	epichlorohydrin bisphenol	—	—	0.605-0.612	laminating
	"	—	—	0.615-0.622	"
	"	—	—	0.855-0.865	"
	"	—	1.15-1.17	0.80-0.97	casting, molding, potting
	"	—	550-650	0.605-0.612	—
	"	—	wt/per epoxide 450-525	0.615-0.622	—
	"	—	wt/epoxide 235-275	0.855-0.865	—
The Marblette Co.	"	—	wt/epoxide 1.15-1.17	0.80-0.835	—
	epoxy	cast	1.60-1.70	1.55-1.60	tooling purposes
	"	laminating	1.35	1.45-1.50	"
Mitchell Rand Mfg. Co.	modified epoxy	encapsulating	—	—	electrical insulation
"	"	casting	—	—	"
Polymer Industries, Inc.	epoxy	—	1.00	0.80-3.00	adhesives
Rezolin, Inc.	epoxy (L-900 and 900W)	high impact	23.256 cu.in./lb.	1.54*	tooling
	" (L-910 and 910W)	"	22.7 cu.in./lb.	1.83*	tooling gelcoat
	epoxy metallic casting (L-930)	"	22.3 cu.in.	1.53*	tooling
	flexible epoxy (L-940)	"	22.9 cu.in./lb.	1.96*	"
Shell Chemical Corp.	epoxy	—	10.25 lbs./gal.	1.55*	castings, laminating, adhesives
	" (EPON 562)	—	—	—	—
	" (EPON 828)	—	10.27 lbs./gal.	0.80*	casting, laminating applications, adhesives
	" (EPON 834)	—	9.72 lbs./gal.	0.855*	castings, vinyl stabilizer
	" (EPON 864)	—	9.89 lbs./gal.	0.91*	protective coatings
	" (EPON 864-C-75)	—	—	0.73*	"
	" (EPON 1004)	—	9.63 lbs./gal.	0.595*	"
	" (EPON 1001)	—	10.05 lbs./gal.	0.615*	printed circuit laminates, protective coatings
	" (EPON 1007)	—	9.56 lbs./gal.	0.605*	protective coatings
Stanley Chemical Co.	epoxy (84 X15)	high heat resistance	9.92 lbs./gal.	0.69*	"
	"	—	10.31 lbs./gal.	—	core driers for electronic core drying ovens

## Silicones

Bakelite Co., Div. U. C. C.	silicones	—	—	—	—
Dow Corning Corp.	glass-filled silicone	high impact	1.65	2.50	high-temperature electrical and electronic components

## Miscellaneous

Barrett Div. Allied Chemical & Dye Corp.	paracoumarone-indene (CUMAR Resin)	—	—	—	floor tile, varnishes, natural and synthetic rubber products, adhesives
	neutral synthetic resin of high styrene content (Resin S)	—	—	—	floor tile

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*organic chemicals division*

COMPANY	CHEMICAL NAME	GRADE	SPECIFIC GRAVITY OR DENSITY	PRICE (\$/LB.)	MAJOR USES
American Mineral Spirits Co.	high-molecular-weight olefins (Amasco Petropon 1560)	—	0.940	0.175	—
	high-molecular-weight cyclic olefins (Amasco Petropon 10X)	—	0.909	0.175	—
Atlas Mineral Products Co.	(Furan)	—	—	0.30	corrosion-resistant mortars, coatings, linings
Bakelite Co., Div. U. C. C.	acrylonitrile-styrene copolymers	—	—	—	—
	chlorinated naphthalenes	—	—	—	—
	special polymers and copolymers	—	—	—	—
	acrylonitrile-butadiene copolymer emulsion	water solution	various	0.23-0.31	coatings for paper, leather, textiles
The Borden Co., Chemical Div.	butadiene-styrene latices	water emulsions	various	range 0.16-0.30*	paints, paper coatings, industrial coatings
	formaldehyde resins	—	—	—	laminating, bonding, impregnating
Catalin Corp. of America	synthetic ion exchange resins (Duolite)	—	—	—	—
Chemical Process Co.	aniline-formaldehyde (Cibanite)	powder	1.22	0.64*	adhesive for manufacture of grinding wheels, molding, construction parts
Ciba Company, Inc.	flame-retardant plastic for electrical insulation (Rulan 2)	—	0.605	0.535	wire insulation
E. I. du Pont de Nemours & Co.	furane resins	liquid	1.25	0.75	adhesives and coatings
	cyclized natural rubber	solution and melt	1.00	0.93	paper coatings, hot melts, inks
Furane Plastics, Inc. Chemical Division	terpene resin (H.S.R. Dried Resin)	high melting	1.00	5.00	mounting microscopic specimens
Goodyear Tire & Rubber Co.	chlorinated polyether (Penton)	—	1.40	6.00	chemical equipment, electrical equipment, film
Hartman-Leddon Co., Inc.	cashew-nutshell liquid (Cardolite)	binding resin, dusts	1.00	—	friction elements
	uran (furfural-ketone)	—	1.12-1.14	—	acid-resistant cements
National Casein Co.	urea-formaldehyde-furfural alcohol resin (FA 300)	adhesive	9.8 lbs./gal.	0.20	plywood adhesive
Naugatuck Chemical Div. of U. S. Rubber Co.	molding powders (Kralastic)	high impact, chemically resistant	1.02-1.08	0.50-0.58*	pipe and fittings, lawn mower wheels, automotive parts, carrying cases, sheet, helmets, handles, trays, combs
	hydrocarbon resin	210°F. softening point	1.054	0.11	protective and decorative finishes, printing inks, concrete curing compounds and rubber compounding
	"	"	1.100	0.11	"
	"	"	1.059	0.8	"
	"	"	1.091	0.10	"
Pan American Chemicals Corp.	"	"	1.106	0.12	"
	"	"	1.049	0.13	"
	quaternary amine-cross-linked polystyrene	—	—	2.50	ion exchanger
	sulfonated polystyrene cross-linked	—	—	0.55	"
Permutit Co.	aliphatic polyamine condensation resin	—	—	2.50	"

\*Qualified.

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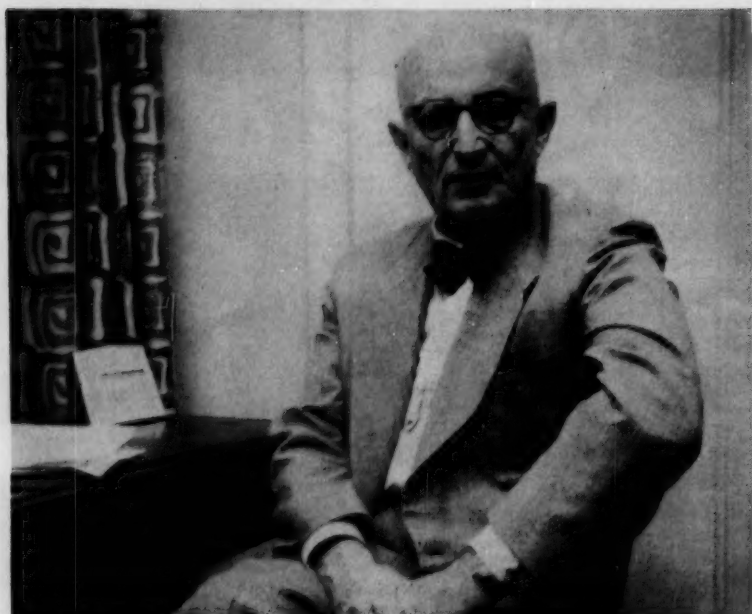
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ALEXANDER SCHOENBERG: The sun's his Bunsen burner.

## Fair-Weather Chemist

On almost any sunny day during the past 15 years a relocated German chemist named Alexander Schoenberg could be found on the roof of Cairo University, busy amidst a glittering collection of corked flasks set out to bask in the Egyptian sun. In Tucson, Ariz., the other week, Schoenberg revealed the rationale of his diurnal scientific labors.

Occasion: the recent conference on solar energy (*CW Technology Newsletter*, Nov. 12) sponsored by Assn. for Applied Solar Energy, Stanford Research Institute and the University of Arizona.

In a brief report to delegates from the U.S. and more than a score of foreign countries, he detailed the chemical products produced in his flasks by sunlight acting upon one or more chemicals.

It's Schoenberg's contention that solar-induced reactions comprise a whole new world to conquer—a territory that is quite different\* from the traditional "dark chemistry."

He believes producers of research chemicals, for instance, could greatly

expand their catalogs (at little cost) by taking advantage of work that has already been done in this field.

Carried out on a purely empirical basis (and on a limited scale) the German chemist's research has turned up a number of heretofore unknown reactions and many new compounds of possible commercial value:

- He has found, for example, that aldehydes are converted into peracids by treatment with oxygen in the presence of sunlight. Perbenzoic acid was produced from benzaldehyde in this manner.

- Benzaldehyde and 1,1,2,2-tetra-phenylethane are produced by exposing benzene solutions of benzoyldiphenylmethane (in an atmosphere of nitrogen) to sunlight.

- Many quinones—e.g., acenaphthenequinone, *o*-benzoquinone,  $\beta$ -naphthoquinones—add aldehydes in sunlight, yield substituted alcohols.

- Olefins were similarly discovered to add to *o*-quinones. Stilbene, for instance, reacts with phenanthroquinone to yield a material with four condensed rings. Analogous reactions reportedly were carried out with derivatives of  $\beta$ -naphthoquinone and *o*-benzoquinone. A "large number" of

heretofore inaccessible materials has been made in this way, reports Schoenberg.

Many of these compounds, made with energy that is free, are worth probing for commercial significance, he believes. While in this country, Schoenberg hopes to interest an American company or research institute in screening his photochemicals or sponsoring his continuing studies.

How much appeal his purely fundamental work will have for American firms is a debatable question. By their very nature, the processes in question demand prolonged and relatively intense sunlight, a condition prevalent (in this country) only in the arid areas of the West. And there's serious doubt whether reactions requiring extensive exposure to the sun could be readily adapted to anything more than flask-scale production.

On the other hand, the use of sunlight in commercial chemical manufacture is not entirely an alien concept. During World War II, the Germans manufactured the anthelmintic ascari-dole in bulk by oxidizing  $\alpha$ -terpinene with air (and chlorophyll) in the presence of sunlight. Chlorophyll, eosin and several other substances function as sensitizers for photo-reactions.

At any rate, Schoenberg feels that the time is ripe for expanding and intensifying solar-chemical research. Whether or not he is right remains to be seen. But last week, after his brief stay in the United States, he returned home to continue the work that will, he hopes, kindle the chemical industry's enthusiasm for the sun.

## Also Under the Sun

What may be the biggest boost for solar energy research to come from the recent Arizona conferences (*see above*) was the birth of a "laboratory of the sun." To be built by the Association of Applied Solar Energy—backed chiefly by Stanford University and the University of Arizona—the fledgling project will be headquartered in Phoenix, Ariz.

Starting out with a budget of \$500,000-750,000, the organization hopes to accelerate development of a high-temperature solar furnace, push research on solar-dissociation of water, among other aims.

\* Reaction of two compounds in sunlight often yields products that are completely different than those obtained in "dark" laboratories. Moreover, avers Schoenberg, side reactions are virtually unknown in solar work.



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RESEARCH . . . . .

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Algae grown experimentally in sewage at the University of California's engineering field station (Richmond, Calif.) may provide partial solutions of both sewage and nutritional problems, according to researcher Harold Gotaas, who heads a sanitary engineering study at the school.

Gotaas claims to have obtained algae harvests equivalent to 30 dry tons/acre/year, with irrigation-suitable water as a by-product. Average yield of California food crops in 1953 (on a dry weight basis) was pegged at 1.5 tons/acre/year.

Because of its high protein content, sewage-cultivated algae might make excellent cattle fodder. It's estimated that California sewage could be made to yield 300 tons/day of protein—about one-third of the state's total cattle protein requirement. On a national basis, algae treatment of city sewage could conceivably yield 4,000 tons/day of protein—enough for one-fifth of the country's cattle.

Right now, this is pure speculation. Before one ounce of protein is produced commercially by Gotaas' technique, many economic and technological hurdles must be cleared.

Harvesting, for example, would certainly pose serious problems. Centrifugation has been used successfully in research, but the economics of the method effectively preclude its application on a mass scale. Experiments are currently under way to recover the tiny plants by chemical coagulation.

A novel approach to the well-worn algae-cultivation problem, the California method apparently calls for no special equipment such as the acres of transparent plastic tubing required by other experimental algae-growing techniques (summarized in a 1953 Smithsonian Institution report). Ordinary tanks are successfully utilized at the Richmond station.

Gotaas estimates that algae could produce up to \$100 worth of high-protein feed for each million gallons of sewage treated. If the sewage process can produce the tiny plants for 5¢/lb. (excluding the normal cost of waste treatment), he avers, it will be economical in areas with a satisfactory (sunny) climate. Results, so far, are quite promising, he reports although a great deal of research remains to be done.

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RESEARCH . . . . .



**FILBERT (left) AND ELLIS: They spearhead the lignite push.**

### **New Look at Lignite**

One barrier to the utilization of lignite tar as a chemical raw material is crumbling under an up-to-16,000 gal./day stream of tar from Aluminum Co. of America's new prototype recovery unit at Rockdale, Tex. Encouraged by the improved supply prospects, a number of organizations—commercial and nonprofit—are re-warming to the challenge of extracting salable chemicals from lignite tar.

Their hopes right now are in the care of Battelle Memorial Institute whose year-old lignite research project (sponsored by Alcoa and Texas Power & Light) has the participation of Barrett Division (Allied Chemical), Carbide and Carbon Chemicals, Celanese, Koppers, The Merichem Co. (Houston), Olin Mathieson, Reilly Tar & Chemical, Spencer Chemical, and Oil and Chemical Products, Inc. (Houston).

Battelle's D. C. Rowlands, J. E. Burch, E. J. Kahler, W. C. Ellis, W. H. Mink and R. B. Filbert, Jr., probing the tar and its distillates, point to potential applications and several other chemical products in plastics, ion-exchange resins, etc.

Right now, Texas Power & Light (Houston) markets the tar, also supplies lignite tar-derived distillate (23% tar acids, 3% tar bases, 74% neutral oils, 0.9% sulfur); tar-acid oils; caustic-washed distillate and tar distillate residue. The firm sees possible applications for its tar acid oils as source of phenols in resin making, reports

that the caustic-washed distillate has a tar base that is a potential source of pyridine and pyridine homologs. The distillate itself has preservative properties similar to those of creosote oils. And the tar residue is said to be usable as a binder in aluminum electrode manufacture and to show promise as a roofing compound or pipe coating enamel.

Further clues to potential uses are forthcoming from research under way in lignite-rich states such as North Dakota.

W. W. Fowkes of the chemistry and physics section at the U.S. Bureau of Mines lignite research laboratory (Grand Forks, N. D.) points out that a large part of lignite tar is highly aromatic neutral oil that would probably make suitable charge stock for cracking to motor fuel.

And University of North Dakota chemical engineer A. M. Cooley believes oxidized lignite is a promising fertilizer. (It's scheduled for government greenhouse trials this winter, field tests next summer.)

Research at North Dakota Agricultural College by R. A. Dunbar, dean of the School of chemical technology, suggests the possibility of lignite-derived epoxy resins. Dunbar feels, moreover, that more work aimed at feasible ways to ferret rare metals from lignite would be worthwhile. Lignite found near Minot, N. D., is said to contain germanium.

But even now, lignite is finding some chemical uses. Examples: the



Cotton skein attached to weight sinks into 0.125% solution of anionic Santomerse No. 1.



Timer starts, skein fully immersed is not yet wet. Contrast loose shape with next photo.



12.5 seconds: skein wet; typical Draves-Clarkson wetting for 0.125% Santomerse No. 1.

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Put Santomerse No. 1 with phosphates and alkalis, and watch it clean rugs. Test its stability with calcium salts in a dairy cleaner. As part of a strong acid or alkali metal cleaner, it will fight grease and oil.

Santomerse No. 1 does an outstanding job in hard water. And note as you handle it, the color, low dusting and flake strength.

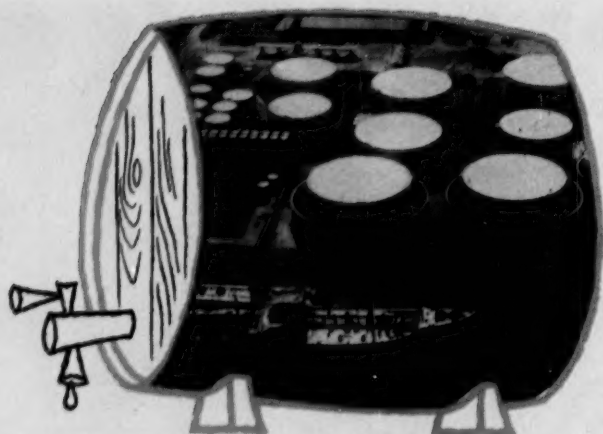
Monsanto makes a full line of wetting agents and builder phosphates. One-source buying brings you impartial advice, fast service, simple ordering and money-saving mixed truckloads.

Call your local Monsanto representative. Or write: MONSANTO CHEMICAL COMPANY, Inorganic Chemicals Division, 710 North Twelfth Boulevard, St. Louis, 1, Missouri.

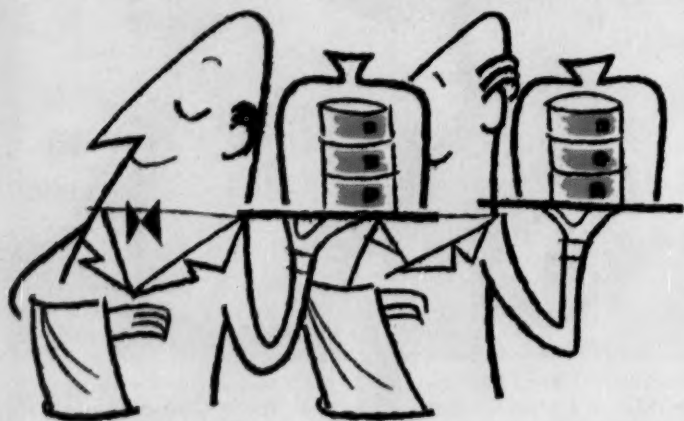
Santomerse: Reg. U. S. Pat. Off.

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Serving Industry... Which Serves Mankind



## STORE IN BULK



## SHIP IN DRUMS

HESS integrated bulk liquid storage terminals in the New York Harbor and on the Gulf Coast are equipped with modern high-speed drumming and canning facilities to meet the needs of your customers or your own process operations.

Take advantage of low seasonal or quantity prices; ship by tanker, barge, tank car or transport truck; and store with complete confidence. Hess individual tanks can handle chemicals, petrochemicals, petroleum products, edibles and other bulk liquids in quantities from 10,000 to 10,000,000 gallons with complete privacy—receiving and shipping through separate piping and pumping facilities. All the benefits of your own storage plant can be yours without maintenance headaches or capital investment.

For the full story write for your copy of new illustrated book telling how your products will be handled and stored. Please address your inquiry to our location nearest you so that we can give it immediate attention.

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Houston, Texas  
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### RESEARCH . . . . .

Dakota Briquet and Tar Products Co. (Dickinson) distills lignite tar into creosote oil and pitch; elsewhere, leonardite (naturally oxidized lignite) is finding outlets as an additive for drilling muds, and in water treatment to reduce hardness, color, and odor.

**Standards:** New American Petroleum Institute standard hydrocarbon samples available from Carnegie Institute of Technology's (Pittsburgh, Pa.) petroleum research laboratory include 3-methyl-1-hexene and 1-ethylcyclo-hexene. Price: \$50/5 ml.

**Lab Adds:** Work has started on a \$33,000 addition to laboratories of Rutgers University's (New Brunswick) bureau of biological research. Contributing to the project are Colgate-Palmolive (\$15,000) and Esso Research and Engineering (\$10,000). Both will occupy space in the addition,



### Polio Pinpointed

**TAKING A CLOSE LOOK** at their newly isolated poliomyelitis virus crystals are University of California's C. E. Schwerdt (left) and F. L. Schaffer. Each crystal is about 0.001 in. long and contains about 1 million virus particles. Until their achievement, no pure human-infecting virus had been obtained in macroscopic crystals.



## Better "dough" for Airfoam\* cushions

When rubber latex was made with raw water, the dissolved minerals in the water often coagulated the latex prematurely . . . resulting in excessive waste.

To remove the minerals, Goodyear engineers distilled the water . . . until increased production overtaxed their steam plant.

So they looked for a way to get the equivalent of distilled water, in volume, at low cost . . . and selected PERMUTIT ion exchange resins and equipment.

• Here's what Goodyear reports after 4 years of continuous operation: "The PERMUTIT units reduce dissolved solids from 165 to 3 parts per million and supply iron-free water of controlled alkalinity. It has proved to be higher in quality than distilled water—at a considerable saving!"

• Modern water conditioning cuts costs in many ways: eliminates dyeing rejects . . . saves a textile mill \$12,150 per year; ends bubbles in ceramic glaze . . . paying for equipment in 10 days; removes salts from auto-body rinse water to prevent blisters in the finish.

• Better water may solve your problem. We can help you get it. Write: The Permutit Company, Dept. CW-11, 330 W. 42nd St., New York 36, N. Y.

\*T.M. The Goodyear Tire & Rubber Company

# PERMUTIT®

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WATER CONDITIONING for BOILERS,  
PROCESSING, PUBLIC and HOME WATER SUPPLIES

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maceti . . . Behenic Acid  
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and Poultry Feeds.

Now, ADM offers the most complete line of oleyl alcohols available anywhere. New fatty alcohols that combine the highest purity of oleyl with a minimum of poly unsaturation. Percentage of oleyl ranges up to 87%.

These new ADOLS put sell into cosmetics, textile chemicals and countless other products. Uses include emulsion stabilizers, emollients, germicides, esters, lubricating oil additives, detergents, chemical intermediates, organic synthesis, defoamers, shampoos, anti-static agents, softeners, penetrants, and others.

ADM doesn't consume any of its Chemifats; the entire output is for sale to industry—in tank-car and LCL quantities. Write for samples of oleyls and other fatty alcohols from ADM's new Ashtabula, Ohio plant.

**Archer-Daniels-Midland company**

CHEMICAL PRODUCTS DIVISION

2191 WEST 110th STREET • CLEVELAND 2, OHIO

## RESEARCH . . . . .

scheduled for completion by Jan. 15.

• At Chauncey, N.Y., ground was recently broken for an addition to Stauffer Chemical's research center. The project will add more than 8,000 sq. ft. of lab and office space at a cost of about \$250,000. Expected completion date: July 1, 1956.

**Equipment Note:** Two new models of the Todd Spectralan are scheduled to be available from Fisher Scientific (Pittsburgh) next month. The device is said to permit rapid identification of 61 metallic and nonmetallic elements. Model C, complete with spectroscope, excitation equipment and power supply, is \$350. Model D is identical to Model C but comes without spectroscope. Price: \$175.

**Safety Peak:** Standard Oil Co. (Indiana) researchers at the firm's Whiting, Ind., laboratories last week topped their previous mark of 7.2 million man-hours without a lost-time accident.

**Virus Synthesis:** University of California's Heinz L. Fraenkel-Conrat and Robley Williams recently split the tobacco mosaic virus into its protein and nucleic acid components, recombined them under mild acid conditions to form the active virus. The achievement marks the first partial synthesis of a virus, opens new doors to virus control. Next step, already being researched at the university: synthetic viruses capable of giving immunity but incapable of causing disease. Other possibilities: reproduction of other self-duplicating systems such as chromosomes (for heredity studies); development of antigens to fight virus diseases.

**Steroid Fungicides:** Research at Schering Corp. (Bloomfield, N.J.) has turned up a number of fungicidally active steroid amines. The most active: 3- $\beta$ -hydroxy-22-(N-piperidino)-allobisnorcholane;  $\Delta^5$ -3- $\beta$ -hydroxy-22-(N-piperidino) bisnorcholene;  $\Delta^5$ -3- $\beta$ -hydroxy-22-(N-pyrrolidino)-bisnorcholene. These inhibited test fungus *Candida Albicans* at concentrations of 0.1-1.0%.

**Amebicides:** Sterling-Winthrop reports potent amebicidal activity in acyl N-(2-hydroxyethyl)-N-(substituted benzyl)-dichloroacetamides.

# Corrosioneering News

Quick facts about the services and equipment Pfaudler offers to help you reduce corrosion and processing cost.



Published by The Pfaudler Co., Rochester, N.Y.

## WORLD PREMIERE . . .

### 1955 Chemical Show sees debut of several New Achievements in Glassed Steel Construction

#### No contamination, no leakage with new seal for reactors



No metallic contamination of your product. No stray, unwanted catalysts. No escaping vapors.

These are the advantages of a new nonmetallic rotary Crane-type seal now available on Pfaudler glassed or stainless steel reactors up to 100 gallons. (A similar design

is also available for larger units.) Only Pfaudler glass, Teflon, ceramic and carbon come into contact with your product. Design of the seal is simple, easily maintained.

#### New development boosts corrosion resistance of columns

Better results from fractionation and other processes requiring a column are now possible with the added corrosion resistance of a new Pfaudler development.

It's a glassed steel distributor plate, available for all size columns. Using Pfaudler acid-alkali-resistant glass, this plate provides complete flexibility of use over a range up to pH 12 at 212° F.

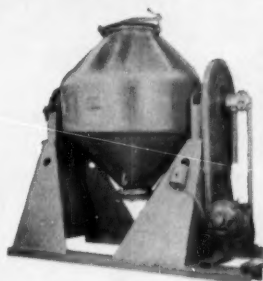
The corrosion resistance of this glass protects product purity, simplifies cleaning, and protects your equipment investment.

#### Dryer-blender tumbles out 4 days' work in 7 hours

In actual use, a Pfaudler glassed steel conical dryer-blender is producing as much dried product in 7 hours as formerly required at least 4 working days, using a different type of dryer.

Double-cone shape, tumbling action and efficient heating design are responsible for this great speed. In addition, a broad range of corrosive applications is possible, because the unit is fabricated of Pfaudler's special acid-alkali-resistant glassed steel.

To pre-test your product in the Pfaudler dryer-blender, a small 2'-



diameter test model is available. You'll see it at the Chem Show — or write us for full details.

#### New Pfaudler hydraulic drive and seal

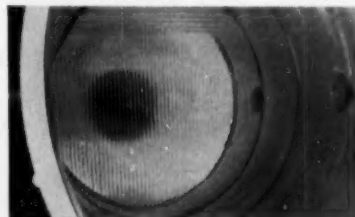
The new Pfaudler hydraulic drive and seal offers many advantages: It can be made in both stainless steel and glassed steel construction for a large range of reactor sizes and for greater horsepower requirements with either hydraulic or air motors.

Any noncorrosive fluid can be used as a seal — even one of the ingredients of your own product — providing you 100% protection against contamination.

This seal is operated under pressure, requires a minimum of maintenance, and is designed to give years of trouble-free service. Your Pfaudler representative can provide full details at your request.

#### New Turbogrid tray gives higher yield at lower cost

You're looking down the throat of a Pfaudler glassed steel Turbogrid



column, at a new tray design that provides enormously high capacities, yet lowers the cost of the column itself.

The tray is constructed of high-strength PYREX brand glass tubes,



Cutaway column, providing an unusual view of the "business side" of Pfaudler glassed steel construction, is a feature attraction at Chemical Industries Exposition, Philadelphia.

with all their inherent advantages of corrosion resistance, physical toughness, and thermal shock resistance.

Because of the high capacity resulting from this design, the column itself can be of smaller diameter than previously required — an important means of cutting its cost.

#### Now—variable agitator speeds ranging from 60 to 340 RPM

Six different agitator speeds: 60, 90, 120, 175, 250, and 340 RPM are now available on Pfaudler reactors up to 100 gallons.

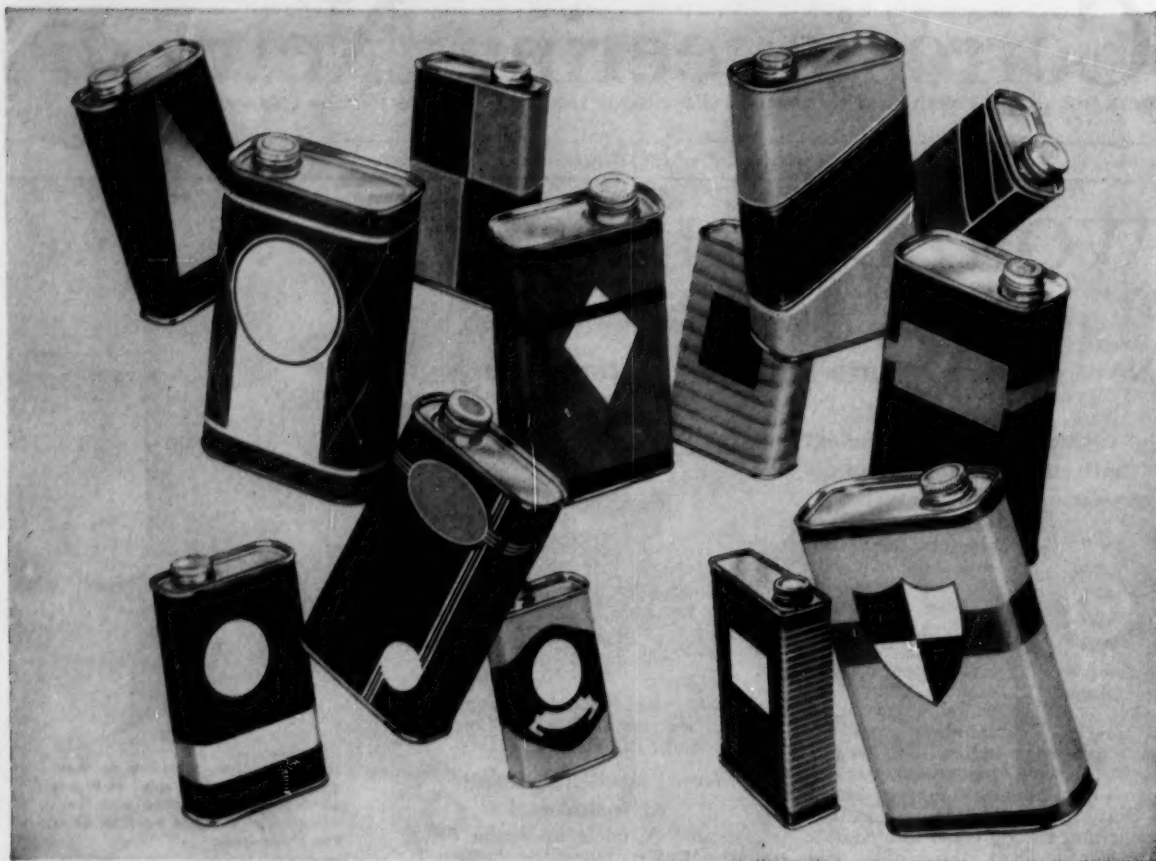
These are made possible by interchangeable constant-speed sheaves of the new PW drive. As an alternative, variable pitch sheaves may be supplied, giving quick adjustment for all speeds ranging from 60 to 300 RPM.

The new PW drive rides high above the top head of the reactor, out of the way so you can have easy access to other nozzles.

Write for Bulletin 923.

#### Which material of construction for you?

Glassed steel, stainless, titanium, Inconel, Hastelloy, copper and copper alloys, and many other corrosion-resistant materials are commonly used by Pfaudler to solve processing problems. Write today for free, unbiased analysis of your problem.



# Continental "F" style cans forecast a sunny future

Today, almost every producer of waxes, polishes, oils, etc., packages in "F" style cans. With Continental "F" styles, however, you can look forward to more than sturdiness and convenience. Colorfully lithographed by master craftsmen, these rugged containers give your product a bright competitive edge on crowded supermarket shelves.

In addition, Continental spares no effort to make Tailor-Made Package Service as appealing as "F" style cans themselves. Whatever size you choose, from four-ounce to gallon, we'll deliver just the quantity you want, just when you want them. And like our packages, research and engineering tailored precisely to your needs are always available.

Let us show you the sunny sales future that "F" style cans offer your chemical products. Call anytime.

**CONTINENTAL**  **CAN COMPANY**

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Central Division: 135 So. La Salle St., Chicago 3  
Pacific Division: Russ Building, San Francisco 4



# Technology

## Newsletter

CHEMICAL WEEK  
NOVEMBER 19, 1955

**Fate of the government laboratories** at the University of Akron—one of the last synthetic rubber facilities still in federal hands—moved closer to settlement last week as Shell Chemical, Hercules Powder and Esso Research and Engineering awarded research contracts to the laboratories.

The three will be sponsoring studies at the rate of \$300,000/year (total) in the first phase of a trial to determine whether the laboratories can survive without subsidies. About 20 other companies are in various stages of contract negotiation at this point.

**Laboratory officials are encouraging additional proposals**, are emphasizing that the doors are open to small firms as well as large. A number of small—\$3,000-5,000—contracts figure into present discussions, they state. All told, upwards of \$500,000 in contracts are being sought.

National Science Foundation, which is charged with disposal of the facilities (and staff, which today is worth at least as much as the physical assets involved), is not enthusiastic about selling to a private company.

**This outcome seems likely:** if the synthetic rubber labs prove self-sustaining on sponsored research, they will be sold to Akron University on a present-worth basis—with the proviso that work for the government would be done at cost. The issue will be decided by an 11-member commission (CW, Sept. 17, p. 62), which will study the problem until June 30, 1956.

**Aureomycin cleared one more formality last week** in its try for an early lead in the food-preservation-by-antibiotics race (CW Technology Newsletter, Nov. 5). Food & Drug Administration officially acknowledged (in the *Federal Register*) the filing by Lederle Laboratories (division of American Cyanamid) of a petition requesting establishment of a tolerance of 23 ppm. of the antibiotic on uncooked chicken.

The agency's final approval is expected momentarily. Then there's a 30-day period for those "adversely affected" to file written objections.

It's not difficult to discern the fine hand of the Miller pesticide amendment in these proceedings. The Miller amendment covers only "raw agricultural commodities"; Lederle asks for a tolerance ruling on "uncooked chicken." Even so, FDA would not be as close to approving the application if the company had not supplied proof that no harmful Aureomycin residue remains on the cooked chicken.

**That's why FDA is not likely to o.k. use of antibiotics** in food that is ordinarily consumed uncooked—the Miller amendment notwithstanding. Antibiotic-treated milk and dairy products, particularly, are extremely poor bets for approval in the near future.

**High hope for an effective vaccine to counter** the so-called APC (adenoidal, pharyngeal, conjunctival) viruses that cause symptoms of the common cold resides in a comparatively broad-spectrum agent due to be tested early next year.

Unlike the Type 3 vaccine reported last week (CW, Technology Newsletter, Nov. 12) by U.S. Public Health Service, the new prophylactic is said to be effective against Types 3, 4, and 7 of the 10 recognized APC viruses. It's slated to be tried for potency and safety on some 10,000 army recruits, a relatively large proportion of whom could normally be expected to come down with upper respiratory infections.

## Technology Newsletter

(Continued)

Parke, Davis is reported to be considering production of the triple-threat vaccine. But if it, or another firm, does not get into production before the scheduled tests, National Institutes of Health probably will turn out evaluation quantities of the material.

Firestone's "alkali metal" catalyst (*CW Technology Newsletter*, Nov. 12) for synthesizing its "synthetic natural" rubber is lithium. It's prepared as a 35% dispersion (of particles having a mean diameter of 20 millimicrons) in petroleum jelly by melting the metal in the dispersant, subjecting the molten mass to 18,000 rpm. agitation at 200 C for about 30 minutes. The entire operation is carried out under helium.

How big a jump you can safely make from lab bench to pilot plant is a question that's open for dispute, but the Sugar Research Foundation has found that, in terms of distance, the jump from New York City to Toledo, O., is too big. Sol Boyk of Ottawa Chemical has been pilot-planting the sugar-based detergent process developed by Foster Dee Snell (*CW Technology Newsletter*, Oct. 8). But Boyk was just too far away from Snell's know-how.

Pilot plant operations are being switched to the Berkeley Chemical Corp. (Berkeley Heights, N. J.), manufacturing division of Millmaster Corp.

Sample quantities of two new board-surfacing resins will soon be issuing from American Cyanamid. Modified triazines, the still-experimental products (tagged PDL-1-2247 and PDL-1-2352), reportedly may be used to put decorative and protective finishes on furniture, doors, wall panels, etc.

Low-pressure application is Cyanamid's chief selling point. The company claims that the resins may be applied at pressures of 250 psi. That means low-cost materials (Masonite, chip board, etc.) may be processed in conventional laminating presses. Surface properties of "representative" boards, avers the firm, "approach" those of standard decorative melamine laminates (which require up to 1,200 psi. to process).

Researchers Richard Lindenfels and H. P. Ledden reported the resins at this week's plastics meeting (Brooklyn, N. Y.) of the Technical Assn. of the Pulp and Paper Industry.

General Electric last week put the finishing touches on a new process that could open doors previously closed to polyethylene: it succeeded in adding reinforcing fillers to irradiated polyethylene.

This is how General Electric views the work: irradiation of polyethylene beefs up its properties appreciably. But irradiation plus the use of fillers is even better. It reports, for instance, that creep deformation of normal polyethylene can be reduced as much as 90% by the use of the two techniques. Also, tensile strength is five to eight times as good in the upper temperature ranges; "tear strength" and "cut-through" qualities are better, too.

Work is now concentrating on irradiated polyethylene filled with carbon black.

Previous attempts to "fill" polyethylene have not been too successful. In fact, the use of fillers has for the most part tended to degrade the product rather than improve it. However, the use of polyethylene fillers and blends is certainly a field to watch. The new Phillips polyethylene, for instance, reportedly blends beautifully with rubber.

*An important new source of*

# ADIPIIC ACID



*should be important news*

**to the rubber, plastics, plasticizer,  
synthetic lubricant and chemical industries**

**to all who are developing new and  
better monomeric and polymeric esters**



National Aniline's new Adipic Acid plant at Hopewell, Virginia is important to America and to American industry. For its production of this versatile dicarboxylic acid will be both substantial and basic.

Through Allied Chemical resources, it is completely integrated right back to the most basic raw materials. Through Allied Chemical research, the manufacturing process is efficient, uniform, continuous. Through modern plant engineering and construction, its output will be competitive in every respect.

From present and potential users of ADIPIIC ACID, we invite inquiries for samples, technical data and quotations on price and delivery.

## SEND FOR TECHNICAL BULLETIN I-12

This comprehensive 8-page technical bulletin on National Adipic Acid gives physical and chemical properties; principal reactions on the carboxyl and alpha methylene groups; solubility curve, and suggested uses with copious literature references. Your copy will be sent without obligation on request.



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**CAPSULE CLASSICS:** Chemical companies are getting their stories on film, are focusing the . . .

CAMERA ASSOCIATES, INC.

## Spotlight on TV Service Films

**Public-service TV films** are rapidly showing up as top promotional tools for chemical interests. Tremendous growth of TV—from 109 stations to

over 450, in the two years since Federal Communications Commission's licensing relaxation—has brought possibilities undreamed of a few years ago. Opportunity: 98% of stations reportedly use such films.

Growing demand of individual stations is for films that can be plugged into public service programs. To meet this, producers are tailoring films to TV requirements: 3-, 5-, 13½- and 27-minute spots.

Best kind, say those who know, are "shorties"—three and five minutes—that can be used to illustrate points of general interest in women's shows, family programs, children's features and the like. Outlets are individual stations, since most can't budget the entire network package, and often originate local-interest service broadcasts.

**Needn't Be Costly:** Although showing times are free, production prices vary depending on scope, length and purpose of film. Five-minute shorties can be produced in a day at a package cost of about \$6,500, get a guaranteed

placement of 75 stations. Final levy: \$87 a showing—a minuscule price to pay for nationwide promotion.

To qualify for free time use, films' commercial content must be shrewdly judged. Says CBS's Perry Miller, film department chief for the network's "Adventure": "Take away the sponsor's name and trademarks, and the film must still stand up."

**No Strict Rules:** Though the amount of commercialism is limited by good taste, no definitive rule can be laid down. Success or failure is largely a matter of the producer's judgment, sense and skill. Even then, problems arise, such as with a recent film on nylon stockings, which included a sizable footage of legs. An overwhelming success in the North, it was a "turkey" down South.

Most films aim at providing material with wide audience appeal, ranging through any subject matter the sponsor can apply to his products. Recent examples: "How to Paint a Room" (Du Pont), a piece on the history of sleeping materials (U. S. Rubber).



**CBS's PERRY MILLER:** 'Take the product away; there's still a story.'

**Distribution's the Crux:** Distribution can be handled a number of ways. Most companies maintain their own libraries, but depend primarily on professional distributors, such as Modern Talking Picture Service (New York), which handles films for a wide variety of firms (among them: Olin Mathieson, Monsanto, Bakelite, International Minerals, Spencer, Celanese and a number of pharmaceutical and oil companies).

MTPS uses a network of offices in cities throughout the U.S. to place films. Armed with catalogs and personal contacts, it manages typical runs of 200 completed bookings a year, at \$15 apiece, before TV audiences averaging about 40,000/booking. Its most recent survey reveals good usage during prime broadcasting periods (*see box*).

Key to sound distribution, according to experts, is to refrain from flooding TV stations with material, to present them with films designed for use within frameworks of regular features. Turndowns are minimized in this way, are attributed to commercial content, entertainment value, story, rather than applicability. MTPS's reject rate: 15%, which is more than offset by repeat showings.

Still another distribution method stems from the development in the past couple of years of companies specializing in production and placement as well. Such a firm is Walter Harrison

Smith Productions (New York), whose clients include Du Pont, Dow Corning, Victor, U. S. Rubber and American Cyanamid. The firm guarantees a minimum of 75 showings for every film it produces, charges \$10 apiece for additional bookings, usually hits about 200 for any one film.

Smith's package is simple. For \$2,895 (plus cast and sets—usually about \$3,500) he'll undertake to produce and place a five-minute film for noncompeting clients, will prepare it for sound or silent presentation to meet preferences of "fem-cee's" conducting the programs. He then offers it on an exclusive-area basis to individual stations, normally doubling the coverage that could be attained on a network-aired program.

**Four Do's:** Those conversant with TV films raise some points of assistance for companies thinking of sponsoring such promotion. Among them:

- Use films for public relations, not advertising.
- Work from research, not a "hot hunch."
- Make film adaptable to station presentation preferences.
- Get reports on film showings.

That promotional films have been refined a great deal since the 30- or 40-minute opus seen on former-day shows, there isn't much doubt. TV films, many chemical companies feel, offer opportunities to promote their products that can't be passed up.

## SERVICE FILMS GET GOOD BOOKINGS

(Random sample of 3,138 such bookings in 8 months, July '54—Feb. '55)

TIME BREAKDOWN			FILM POTENTIAL	
Period	Class (as rated by stations)	Class Ratio (% of 18 hours operation 7-1 a.m.)	Booking Share (% of 3,138 bookings)	Number of Bookings
8 p.m.-10:30 p.m.	AA	13.9	14.4	451
6-8 p.m.; 10:30-11 p.m.	A	13.9	24.2	761
12-6 p.m.; 11 p.m.-12M.	B	38.9	53.0	1663
Pre-12N.; Post-12M.	C	33.3 100.0	8.4 100.0	263 3,138

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(POLYVINYL ALCOHOL)

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For samples and information write  
Department 287

### SPECIFICATIONS

VINOL Polyvinyl Alcohols now available in following grades:

PA-5, PA-20, PA-40  
(88% hydrolyzed)

Low, medium and high viscosity  
partially-acetylated grades

FH-100, FH-400, FH-500, FH-600  
(99+% hydrolyzed)

Low, medium and high viscosity  
fully-hydrolyzed grades

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Seattle, Portland, San Francisco, Los Angeles

These men ordered

## CHLORINATED METHANES

from  
**DIAMOND**

"I got my METHYLENE CHLORIDE (Dichloromethane) from DIAMOND. They make two grades: Refrigeration (RG) and Paint Remover (PRG). Used for aerosol propellant and extractants, too. Underwriters' rates it nonflammable under ordinary heat, and we used it, up to 60 C., in the presence of air, water and light. Shipped in tank cars, drums and cans."



"Sure, we always order DIAMOND's METHYL CHLORIDE (Chloromethane). Resists oxidation up to 200 C. Fine thermal stability, with little decomposition below 400 C. in the absence of air and water. Comes in tank cars only as liquefied gas under pressure."



"DIAMOND ships our Technical grade CHLOROFORM in tank cars, drums and cans; our U.S.P. grade in cans and drums. We use both with common construction materials up to 120 C."



You'll be pleased, too, with DIAMOND chlorinated methanes. They're shipped promptly. Simply phone your nearby DIAMOND sales representative. Or write DIAMOND ALKALI COMPANY, 300 Union Commerce Building, Cleveland 14, Ohio.

**Diamond**  
**Chemicals**

DISTRIBUTION . . . . .



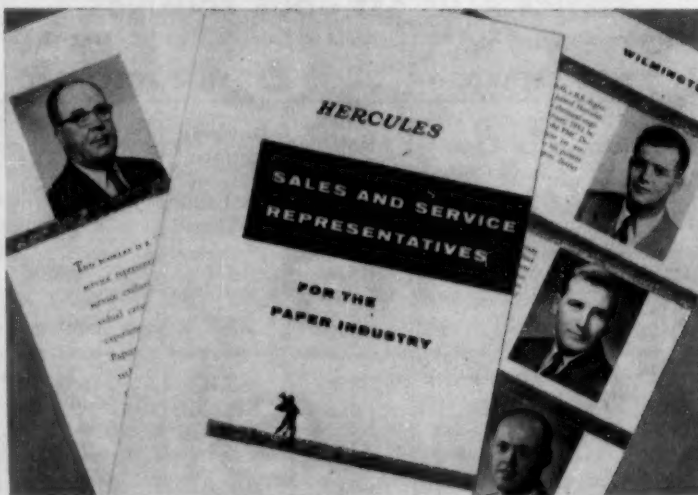
## Convenience Spurs the Sale

OVERSEAS or at home, the chemical process industry finds convenience a big factor in keeping customers happy. The current German contribution (as recent trade fair visitors may have noticed) is the pocket-size technical brochure. Measuring about 6x8 in., these booklets are written in terse style, are less bulky than American counterparts, and conveniently fit into suit pockets to facilitate off-moment reading.

About the same size but completely different in content is a new

directory of Hercules Powder sales personnel. To be circulated to company customers, its aim is to aid Hercules customers in maintaining old friendships with company people since relocated. Secondary purposes: a reminder of Hercules; an internal directory. This is accomplished by a picture, biographical sketch, and company address for each sales representative.

Friendship-fostering directories, easy-to-carry booklets both spell customer convenience—the consideration that builds future sales.



**For Tomorrow's Reference:** Biological pharmaceutical and cosmetic bases—two booklets describe specifications, physical constants and the applications of imported fatty acid-base waxes for use in cosmetic and pharmaceutical compounding. Fallek Products Co., Inc. (New York).

- Adipic acid—technical booklet presents chemistry of carboxyl and alpha methylene groups, suggests applications, and has a bibliography. National Aniline Division, Allied Chemical & Dye Corp. (New York).

- Triethylene glycol dipelargonate—folder offers technical data, performance information, and suggestions for use in plasticizing various rubbers, cellulose, vinyls, and other polymers for low-temperature service. Emery Industries, Inc. (Cincinnati).

- Color pastes—data sheets delineate heat and light stability, migration and crocking, alkali resistance, and relative strength properties of calibrated color pastes for vinyl compounding. Claremont Pigment Dispersion Corp. (Brooklyn).

- Coating resins—revised bulletin lists in chart form technical characteristics and description of many coatings resins for use in paints, varnishes, lacquers and related products. Barrett Division, Allied Chemical & Dye Corp. (New York).

- Sales Manager's Guide—book contains sections on how to use consultants, assistants, advertising agencies, communications. Price: \$1.75, American Management Assn. (New York).

**Expanding Sales Coverage:** Arapahoe Chemicals Inc. has designated R. De Neve (Brussels) sales agents for its chemicals in Benelux countries, Canada, Mexico, Italy and Switzerland.

- Pennsylvania Industrial Chemical Corp. (Clairton, Pa.) is opening a new office in Los Angeles to serve as a company sales and technical development center.

- Eagle-Picher Co.'s pigment division has chosen Akron Chemical Co. (Akron, O.) as sales and technical representative for zinc oxide sales to rubber industry in Ohio, Indiana, Michigan, western New York and Pennsylvania.

- Nopco is setting up two new sales departments in Richmond, Calif.: industrial chemicals, and vitamins.

## WHY CARRY A LARGE INVENTORY?



GET IMMEDIATE SHIPMENT FROM...



**Maas**

Minimum transportation time from the largest producer with the most complete line of phosphates and photo-pure chemicals in the West.

**BUY MIXED CARS FROM MAAS:**

**ARMOFOS (tripoly) • TRISODIUM PHOSPHATE**

**DISODIUM PHOSPHATE • DRI-TRI (anhyd. tsp)**

**TETRASODIUM PYROPHOSPHATE • MONOSODIUM PHOSPHATE**

**SODIUM ACID PYROPHOSPHATE**

Don't let large inventories be a burden.  
Write for descriptive folder.



**A. R. MAAS CHEMICAL CO.**  
Division of Victor Chemical Works  
4570 Ardine Street • South Gate, Calif.



## Get better control of reaction rates with "right-size" aluminum chloride

For close control of reaction rates, and catalyst feed rates, you can purchase Hooker aluminum chloride, anhydrous, in four mesh sizes:

1. Extra fine grind—unscreened (90-95% through 40 mesh).
  2. Fine grind—unscreened (almost all through 20 mesh).
  3. Coarse grind—unscreened (1 mesh and finer, 25-30% through 20 mesh).
  4. Coarse screened (same as coarse grind, screened to remove 20 mesh and finer).
- This material is a grayish

crystalline solid with maximum iron content of 0.05%. "Extra fine" and "fine" grinds contain 97.5%  $\text{AlCl}_3$ . "Coarse grind" and "coarse screened" contain 98.5%  $\text{AlCl}_3$ .

It is shipped in the following containers:

	<i>lbs. net</i>
5-gal. pails .....	50
10-gal. removable head drums .....	100
55-gal. removable head steel drums .....	550

For samples and technical data, write today.

1905—Half a Century of Chemicals

From the Salt of the Earth—1955

**HOOKEE ELECTROCHEMICAL COMPANY**

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NIAGARA FALLS • TACOMA • MONTAGUE, MICH.  
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G-1760

## Now... effective heat seal bonding at low temperatures with ARCCO Emulsions, Solutions or Hot Melts

For example, do you want to eliminate a costly drying cycle? If so, your answer is an ARCCO hot melt. Do you want a non-tacky coating that you or your customer can subsequently heat seal? Again, the answer is an ARCCO heat seal emulsion or solution. These versatile com-

pounds can be heat sealed at temperatures from 220°F to 400°F, and may be used with conventional equipment.

ARCCO heat seal emulsions, solutions or hot melts open new possibilities in many fields for bonding paper, fabric, films, and foils used in the following end products:



**Upholstery —**  
automobile, furniture  
**Wearing Apparel —**  
jackets, belts,  
accessories  
**Surgical Goods**  
Mending Tapes  
Heat Seal Patches

**Candy and Gum**  
Wrappers  
**Potato Chip Bags**  
Food Packages  
Rug Bindings  
Textile Labels  
Edge Sealing Tapes  
Garment Labels

and possibly your product.

ARCCO Technical Service will be happy to consult with you about the application of these newest ARCCO emulsions and solutions to your product or its package.



**AMERICAN RESINOUS  
CHEMICALS CORPORATION**

RESIN EMULSIONS, SOLUTIONS AND HOT MELTS FOR ADHESIVE BASES, BINDERS, COATINGS, SIZES AND SATURANTS

GENERAL OFFICES: 103 FOSTER STREET, PEABODY, MASSACHUSETTS  
IN CANADA: American Resinous Chemicals of Canada, Ltd., 20 Trent Ave., Toronto, Canada

## DISTRIBUTION . . . .

• Abbott Laboratories has opened a new sales office and distribution center in Kansas City, Mo., to serve parts of six states.

**Coming into Commerce:** Shell Chemical Corp. now has a new, low-viscosity structural resin, EPON 815. Claimed to be 100% active and able to make glass laminates with higher glass percentages possible, the material is expected to find uses in casting and adhesives.

• Polyethylene glycol 600 mono-oleate is now being suggested as a foaming agent for polyurethane foams by the Glyco Products Co., Inc. (New York).



## Destination: Industry

MILESTONE on its path to the chemical big-time was passed this week by methyl vinyl ketone. Stabilizing away some of the chemical's hazardous properties (ready polymerization), Chas. Pfizer & Co., Inc. (Brooklyn) shipped its first carload, announced that full-scale commercial production is now under way. Interstate Commerce Commission approval for shipment has now been granted.

Similar to acrolein, the compound is highly reactive. The vinyl ketone combines—in one molecule—the reaction possibilities of carbonyl and double-bond groups.



(di-decyl phthalate)



(di-iso-octyl adipate)



(di-iso-octyl phthalate)



(di-decyl adipate)



Look to ENJAY for better iso-octyl and decyl alcohols for better plasticizers

*Sebacates...Phthalates...Azelaes...Adipates*

**All of these** high-quality, uniform plasticizers were originally developed from Enjay iso-octyl and decyl alcohols and are conveniently available under the brands of leading plasticizer manufacturers.

**More and more**—superior plastics are being made with these effective and economical plasticizers.

**Be sure of dependable high quality**—ask *your* supplier for these plasticizers made from Enjay Alcohols. Enjay and its affiliates do not manufacture plasticizers.



35 successful years  
of leadership  
in serving industry

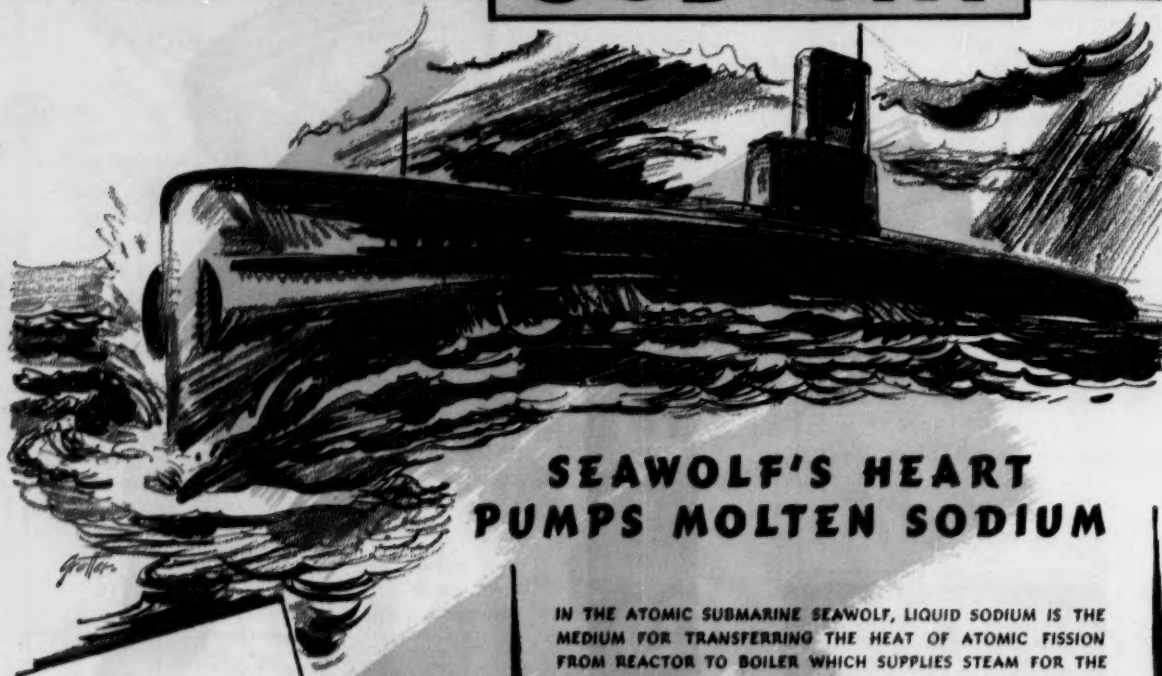
**ENJAY  
COMPANY, INC.**

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ENJAY IS THE PIONEER AND THE WORLD'S LARGEST PRODUCER OF ALCOHOLS BY THE OXO PROCESS

keeping up with

# SODIUM



## SEAWOLF'S HEART PUMPS MOLTEN SODIUM

IN THE ATOMIC SUBMARINE SEAWOLF, LIQUID SODIUM IS THE MEDIUM FOR TRANSFERRING THE HEAT OF ATOMIC FISSION FROM REACTOR TO BOILER WHICH SUPPLIES STEAM FOR THE TURBINE. SODIUM ADVANTAGES:

- EXCELLENT HEAT CONDUCTION
- NO CORROSION OF STEEL
- GOOD ELECTRICAL CONDUCTION PERMITTING CIRCULATION BY A MAGNETIC PUMP WITH NO MOVING PARTS
- HIGH BOILING POINT, SO THERE IS NO NEED FOR PRESSURIZED SYSTEM

THIS APPLICATION UTILIZES SODIUM'S PHYSICAL PROPERTIES. MOST SODIUM APPLICATIONS TAKE ADVANTAGE OF ITS HIGH CHEMICAL ACTIVITY.

**R<sub>x</sub>**

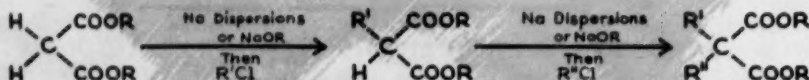
Antimalarials  
Sulfas  
Antipyretics  
Antihistamines  
Vitamin B<sub>1</sub>

For  
Drugs  
and Fine  
Chemicals:

## START WITH SODIUM...

IN THE PRODUCTION OF MANY DRUGS AND FINE CHEMICALS, SUCH REACTIONS AS ALKYLATION, CONDENSATION, OR REDUCTION ARE OFTEN USED. FOR EXAMPLE, IN MAKING BARBITURATES, THE ACTIVE HYDROGENS OF A MALONIC ESTER ARE FIRST REPLACED BY SODIUM, AND EVENTUALLY BY AN ORGANIC RADICAL (SEE EQUATION).

SODIUM ALCOHOLATES ARE COMMONLY USED IN THIS REACTION. IT IS ALSO POSSIBLE IN MANY CASES TO USE SODIUM DISPERSIONS IN PLACE OF THE ALCOHOLATE. DISPERSIONS WITH PARTICLE SIZE OF THE ORDER OF 15 MICRONS ARE EASY TO PREPARE, AND CAN BE USED OVER A WIDE RANGE OF TEMPERATURES (-80°C TO 400°C.)



## ...ALCOHOL PLUS SODIUM...

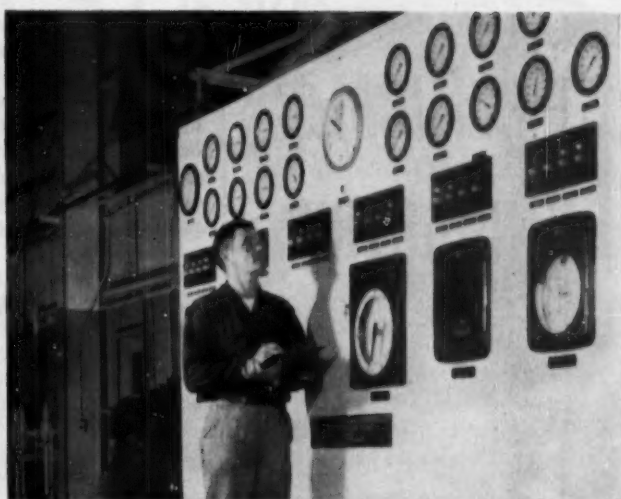
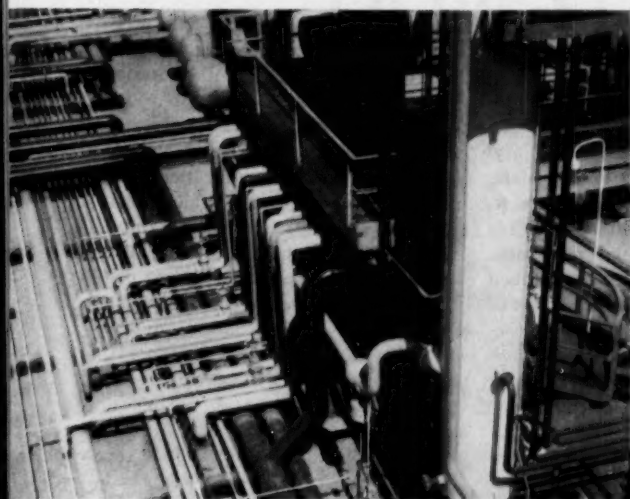
ALCOHOLATES SUCH AS SODIUM ETHYLATE OR METHYLATE CAN BE PURCHASED, OR THE MANUFACTURER CAN PREPARE THEM HIMSELF BY ADDING SODIUM BRICKS OR A STREAM OF LIQUID SODIUM TO AN EXCESS OF ALCOHOL IN A NITROGEN PURGED REACTOR. WHERE ALCOHOL-FREE ALCOHOLATES ARE REQUIRED, THEY CAN EASILY BE PREPARED FROM SODIUM DISPERSIONS. DETAILS ARE AVAILABLE ON REQUEST FROM U.S.I.



SEND FOR U.S.I. BROCHURE ON SODIUM—SEE U.S.I. FOR HELP ON YOUR SODIUM REACTIONS  
**INDUSTRIAL CHEMICALS CO.**

Division of National Distillers Products Corporation  
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Branches in principal cities

# PRODUCTION . . . . .



PIPES AND TOWERS (left) in Liquid Carbonic's new, \$1.5-million, Oakland, Calif., carbon dioxide plant come in 32 colors for both functional and esthetic reasons. Control panel (right) permits operation by two men.

## Automation and C-O-2

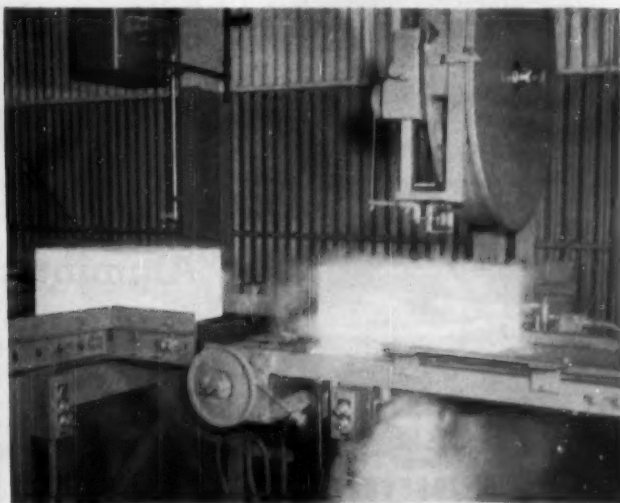
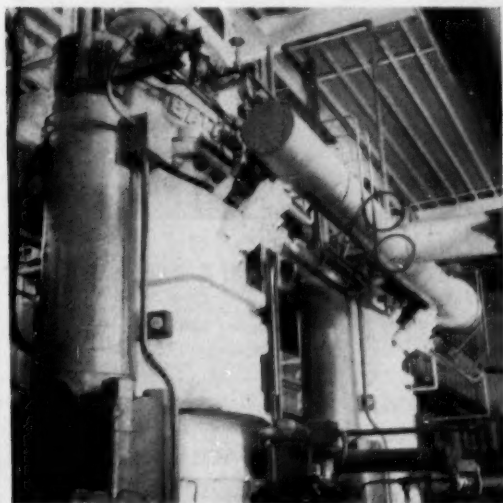
Carbon dioxide plants have always been shining examples of the process industry's penchant for conserving energy. But they've never been famous for their reliance on automatic control. Liquid Carbonic, however, when it decided to build its new \$1.5-million carbon dioxide plant in Oakland, Calif., set out to prove that control engineering is right at home in a modern carbon dioxide plant. The accompanying pictures show how they made out.

The plant can turn out 60 tons/day of carbon dioxide, is operated by only one man on each shift. A second man per shift handles the storage of dry ice. It works off natural gas, which is burned to carbon dioxide. The gas is separated, purified and liquefied, either for shipment (in cylinders, tank trucks or railroad cars), or for conversion into dry ice.

For dry ice production, the liquid carbon dioxide is cooled further until it solidifies into flakes ("snow"). The

flakes are sent through giant presses where, under mechanical pressure, they're converted into blocks of dry ice. The blocks are fed onto a line, sawed in two and then sawed into two again.

Engineers who designed the plant went in heavy for color engineering, used 32 colors to brighten up the plant and to aid in identifying lines for maintenance work. Says William Brown, Jr., president and general manager of Liquid Carbonic: "This plant is our company's idea of tomorrow. It's as close to full automation as we can make it."



DIOXIDE IS SOLIDIFIED, pressed into cubes (left). Blocks are automatically sawed in two (right).

*Check Tennessee's*

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As basic producers of Copper, Iron, Zinc and Sulfur, we maintain exacting **QUALITY CONTROL** from the raw material to the finished product. You can be assured of **UNIFORM QUALITY** if it bears the TC label.

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- COPPER CARBONATE
- COPPER HYDRATE
- CUPRIC CHLORIDE
- CUPRIC OXIDE
- MANGANESE SULFATE
- MONOHYDRATE MANGANESE SULFATE
- MANGANESE OXIDE
- MANGANESE CARBONATE
- FERRIC SULFATE
- SULFUR DIOXIDE
- MONOHYDRATED ZINC SULFATE
- CHLOROSULFONIC ACID
- ORGANIC SULFONIC ACIDS (AND DERIVATIVES)

Samples, specifications and detailed information upon request.



**TENNESSEE CORPORATION**  
617-629 Grant Building, Atlanta, Ga.

PRODUCTION . . . . .

## Sulfonation a la Francaise

From the European press this week comes word of new continuous sulfonation process that has American detergent manufacturers asking questions. It's employed for automatic sulfonation and neutralization of aryl alkyl hydrocarbons in a French plant, designed and built by the Société R. and J. Moritz, of Chatou.

Though details of the equipment have yet to be disclosed, it's described as consisting essentially of a series of three equal-size water-jacketed reactors, a centrifuge, and a neutralizer.

The sulfonation of hydrocarbon with sulfuric acid or oleum is effected, for the most part, in the first reactor. In the second vessel, the reaction goes to completion and the temperature of

the materials is stabilized. The products then pass into the third vessel, where they are mixed with water to a prescribed dilution.

Excess aqueous acid is separated from the paste-like sulfonated product by centrifugation. Neutralization takes place in a screw conveyor, which transports the material countercurrent to a flow of sodium hydroxide solution. The finished sodium sulfonate is then discharged to conventional equipment for drying.

A key component of the system, and one that's likely to attract a good deal of interest from U.S. producers, is the turbo-reactor that, says Moritz, assures high heat-exchange efficiency in each of the first two vessels. Heat



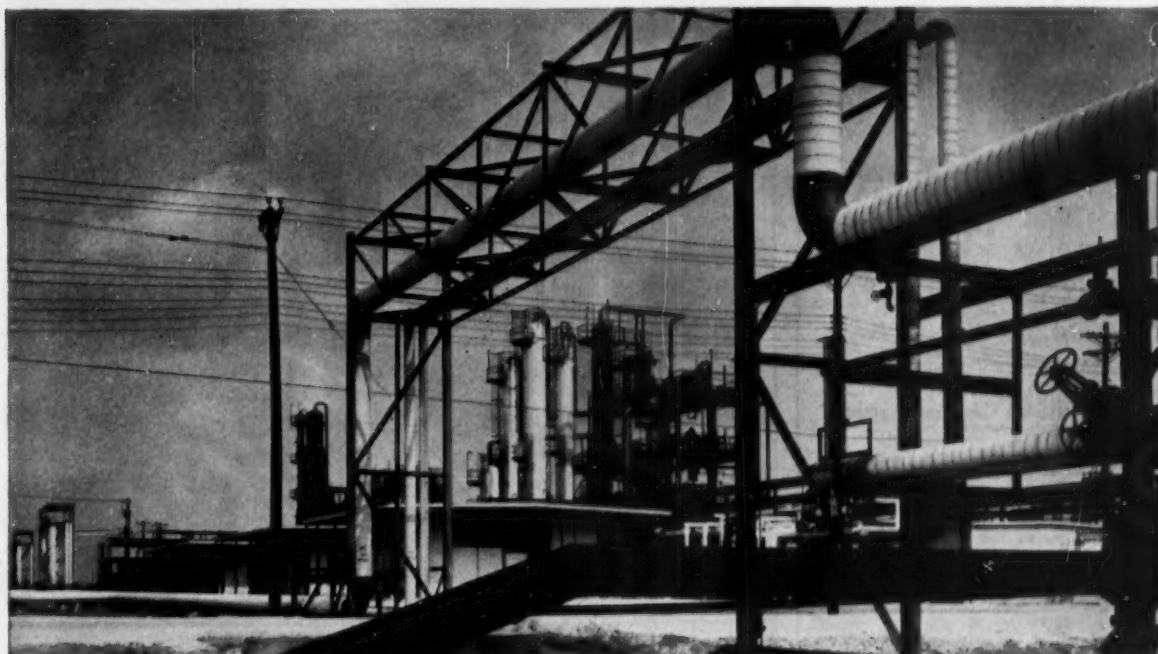
## Aluminum Ore Goes over the Hill

FIRST LEG of bauxite's journey, from Kaiser Bauxite Co.'s open pit mines on the island of Jamaica to Baton Rouge, is a new high-tension belt-conveyor system. Carrying the ore 1,305 ft. over a 250-ft. incline at a speed of 450

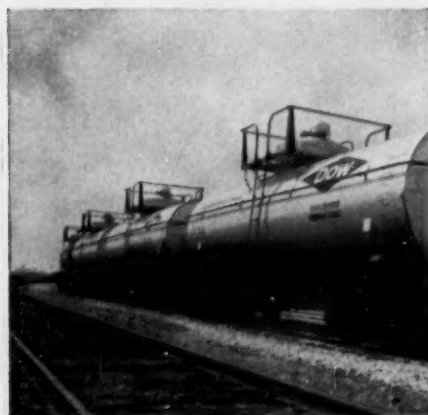
ft./minute, it dumps 600 tons/hour on rail-side stockpiles. From there, clamshells load the bauxite aboard railroad cars, which transport it another 11 miles to 10,000-ton ore vessels, Louisiana-bound from Port Kaiser.

# DOW ON STREAM WITH GLYCERINE!

new supply of synthetic assures stability for glycerine users



*Dow glycerine plant, with a rated capacity of 36 million pounds per year, provides an important new source of supply for industry.*



*Aluminum tank cars will provide fast delivery of quality-maintained Dow glycerine from several bulk stock points throughout the country. Shipments are also made in resin-lined drums and tank trucks.*

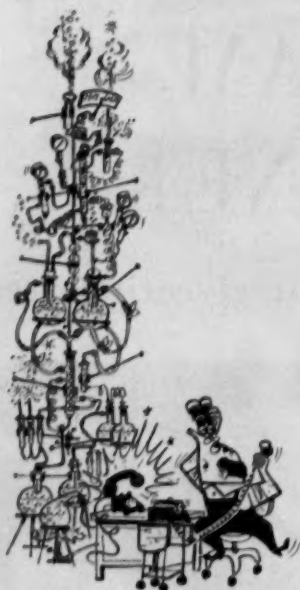
The entry of Dow into this important field of manufacture is increasing the availability of synthetic glycerine and exerting a stabilizing influence on the glycerine market. Also a factor in stability is Dow's basic position—all raw materials required in glycerine production are manufactured by Dow.

This is good news for the major industrial users of glycerine—manufacturers of alkyd resins, humectants for tobacco products, dynamite explosives, and plasticizers in cellophane, adhesives and paper—as well as smaller but important users in 1,500 other applications.

For an immediate evaluation sample, property data or delivery details, write to your nearest sales office of THE DOW CHEMICAL COMPANY.

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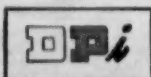


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We've been making Eastman Organic Chemicals for 35 years and there are some 3500 of them which we supply regularly to science and industry. When you need special organics in quantity, you'll usually find it cheaper to make use of our experience and equipment than to try unfamiliar syntheses on your own hook.

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## PRODUCTION . . . . .

transfer is essential to critical temperature control of highly exothermic sulfonation reactions; is, in fact, the principle aim of such equipment as Girdler's Votator and the modified centrifugal mixing pump developed by Chemithon Corp. (CW July 2, p. 66).

Though the first installation was designed for large-scale production, the process is said to be adaptable to much smaller plants. Engineering is being handled by Moritz Chemical Engineering Co., Ltd. (London, England) as well as by the French firm.

## EQUIPMENT . . . . .

**Bagging Bulletin:** Design and operating features of Stoker bag packers are shown off by photos and line drawings in a new bulletin put out by H. L.

Stoker Co. (Claremont, Calif.). The packers use four weighing points for repetitive accuracy to less than plus-or-minus 0.5%, incorporate special features to eliminate wasteful dust and dribbling between fills.

●  
**Clogproof Nozzle:** Lint and other fine foreign matter in the air can't interfere with the spray delivered by Carrier Corp.'s (Syracuse, N.Y.) new self-cleaning Cant-Clog spray nozzles. A flexible diaphragm, containing the orifice, stretches as pressure builds up behind an obstruction, causing the orifice to expand and expel the restrictive particle. Soon to become standard equipment in all Carrier spray-type air conditioners, the nozzles are available in conventional sizes as replacement parts for a variety of



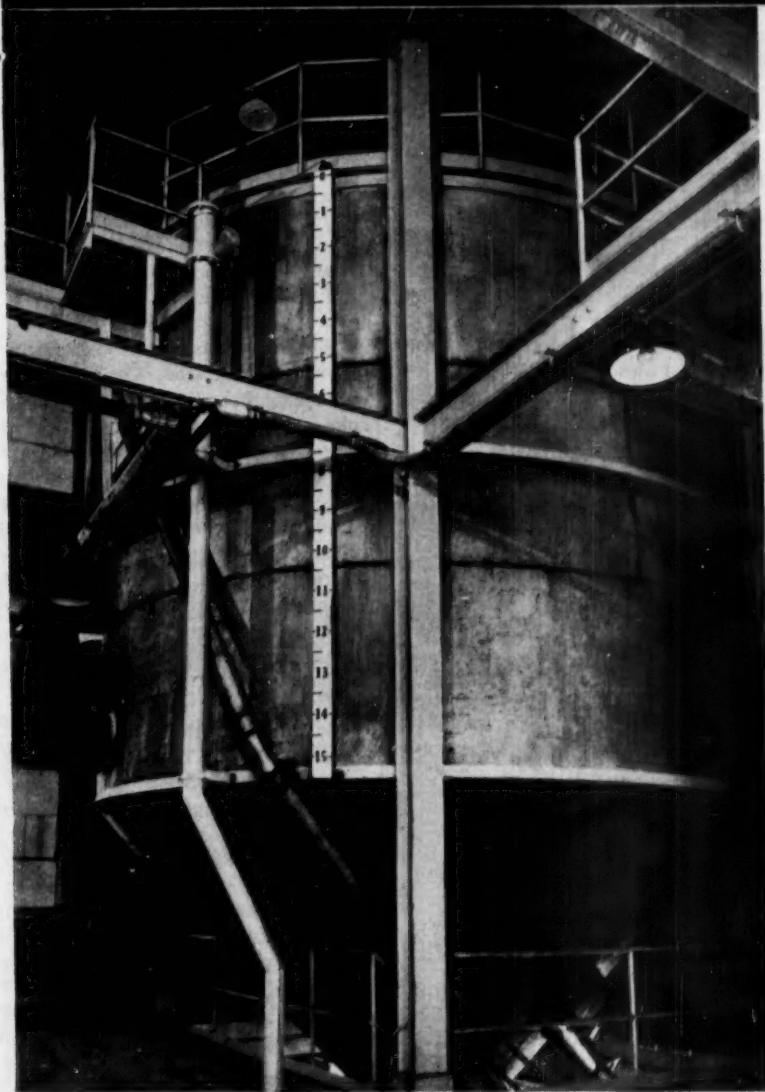
## Shooting for Higher Productivity

**WORKMEN AT HANFORD** Atomic Products Operation employ a new wide-angle atomic ray detector to monitor radioactive material being removed from a flat-bed truck. Developed by General Electric scientists, the device is

more effective than were earlier types for registering rays that come in at an angle. Improved radiation detection, by reducing the safety factor used in computing allowable exposure, increases the time that workers may stay in a "hot" area.

Niagara's new plant facilities  
assure purity and uniformity for you in

# *Nialk* CARBONATE OF POTASH



From this huge central storage silo, NIALK Carbonate of Potash is fed to all loading points for filling bags, barrels and hopper cars.

## NIAGARA ALKALI COMPANY

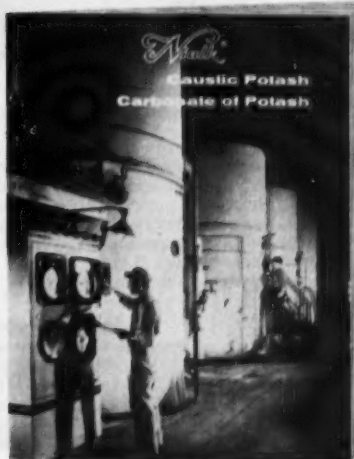
60 East 42nd Street, New York 17, N. Y.

Plant: Niagara Falls, N. Y.

Niagara is setting top standards in the production of carbonate of potash. From raw material to finished product, NIALK chemicals pass through scrupulously clean processing equipment to spick-and-span containers. Quality checks are performed at every stage of the process to protect purity, guarantee uniformity.

These modern facilities and methods, coupled with Niagara's long production experience and reputation for quality, are your assurance of dependability in NIALK Carbonate of Potash. Your products and processes will benefit from this quality protection.

Send for free illustrated booklet, NIALK CAUSTIC POTASH, CARBONATE OF POTASH, containing valuable data on the use and handling of these chemicals.



## FINANCING FOR GROWTH OR ESTATE PLANNING

WE do all types of corporate financing for growing businesses.

WE arrange long and short term loans with lending institutions.

WE underwrite the sale of bonds, preferred and common stock to the public in general.

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WE arrange the transfer of entire businesses for cash or on a "tax-free" exchange basis.

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WE have been successful in selling minority interests for owners of substantial businesses with estate planning problems.

WE have had broad experience in determining the most economical method of financing consistent with corporate dignity, credit considerations and status in the industrial and financial community.

WE shall be glad to discuss your problem without obligation.

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*in every form ...  
for every possible use!*

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- ☐ AMMONIUM BIBORATE
- ☐ AMMONIUM PENTABORATE
- ☐ POTASSIUM PENTABORATE
- ☐ POTASSIUM TETRABORATE
- ☐ SODIUM METABORATE
- ☐ SODIUM PENTABORATE
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DIVISION OF BORAX CONSOLIDATED COMPANY

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CLEVELAND  
PHILADELPHIA  
LOS ANGELES

## PRODUCTION . . . . .

existing air-conditioning equipment.

**Portable Compressor:** The Cornelius Co. (Minneapolis, Minn.) is out with a 38-lb. compressor that delivers 1.75 cfm. of air at a rated discharge pressure of 3,000 psi. Designated as Model 13OR1500, the unit comes complete with three-stage compressor, oil filter and moisture separator, self-resealing relief valve, 0-4,000 psi. gauge, and an integral 110-220-voh 60-cycle ac. motor.

**Heavy Moves:** Moving heavy equipment can be a quick, safe and easy in-plant operation, says Mighty Mover Co. (Denver, Colo.), with a set of its dollies that bolt on to machinery like over-size roller skates. Sold in sets of four, the dollies are made to transport loads of up to 90 tons over rough or uneven floors and through full 360° swings.

**Sintered Filter:** The Cuno Engineering Corp. (Meriden, Conn.) is now producing Poro-Klean filters of porous, sintered stainless steel. Made in particle-size retention grades of 3-30 microns, the filters are suitable, says Cuno, for such unusually severe conditions as temperatures to 1200 F. differential pressures of 2,000 psi., with corrosive liquids or gases. Standard cylindrical or cell-type elements are designed to fit production line housings; special units can be custom-designed.

**Backwasher:** Graver Water Conditioning Co. (New York City) has come up with a new device to overcome backwash difficulties which occur in filtration and ion-exchange materials. It's a subsurface washer that's said to effectively eliminate channeling and short circuiting, and to prevent bed fouling.

### Next Week . . .

CW will take you on a pre-view tour of the 25th Exposition of Chemical Industries. We'll spotlight some of the products that will be unveiled there, also go behind the scenes to see how the show is put together and give you a refresher course on how to get into, out of and around Philadelphia.



# How "Dutch Boy" Chemicals help the paint industry make good products better

What can "Dutch Boy" Chemicals do for you?

Well, just take a look at what *one* has done to make *one* good paint product better. It may give you an idea.

The chemical in question is new *Dutch Boy Bentone\* 34* — a gelling agent developed by National Lead Company research less than four years ago.

With *Bentone 34*, paint makers have been able to get a controllable increase in viscosity — smoother brushability — better color control — reinforced film — pigment suspension — long shelf life.

Not only that! But with *Bentone 34*, the paint industry has improved the workability and durability of a wide range of pigmented products including interior and exterior paints... stains, varnishes and primers.

And with the same versatile gelling agent, other industries... ink, wax, cosmetic, pharmaceutical, oil... have made equally important product improvements.

*If you want to explore...*

the use of *Dutch Boy Gelling Agents* in your product...

Or if you want to look into National Lead's newest developments in vinyl stabilizers... in new double-duty plasticizers giving a unique combination of low volatility and low temperature flexibility... just fill out the coupon. And mail it to us, attached to your letterhead.

\*Reg. U. S. Pat. Off.



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**Buy**

**Dutch Boy  
CHEMICALS**

*...and get the plus  
of a name you know...for quality*



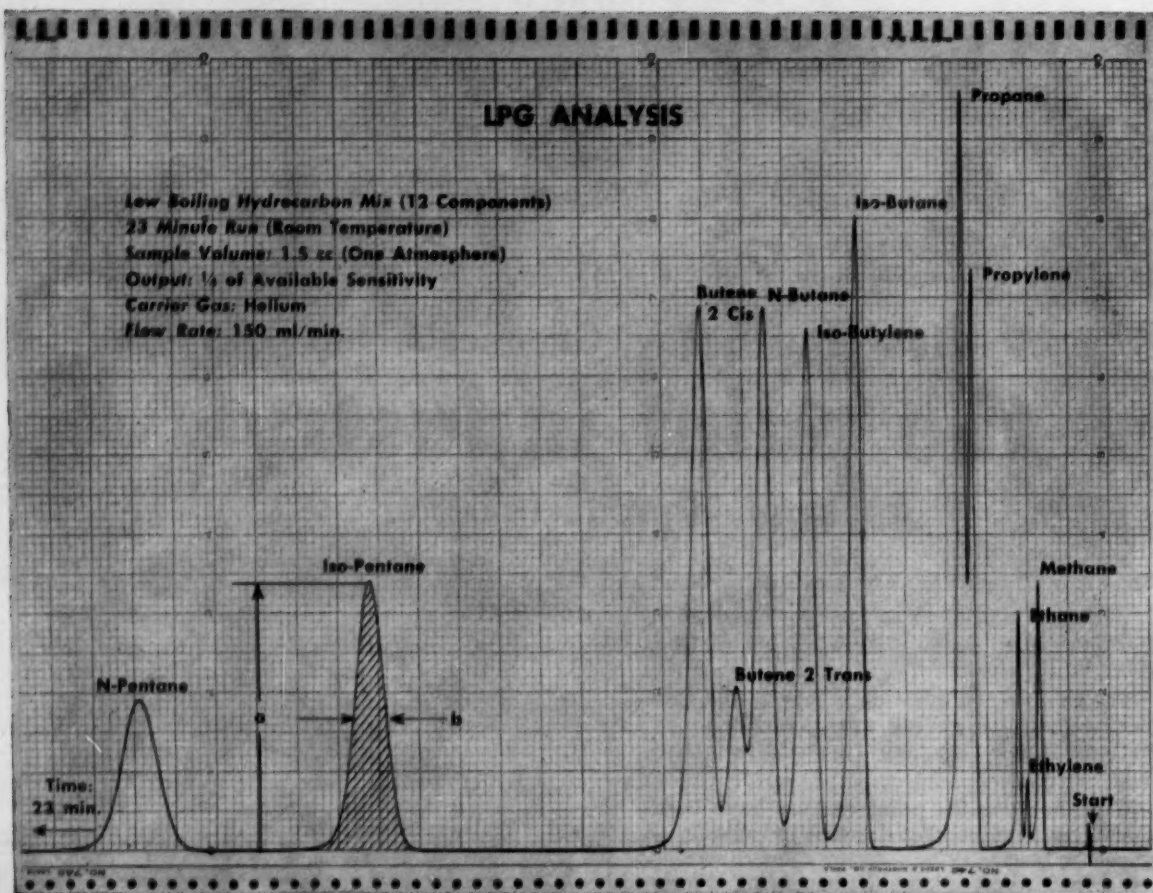


Photo of actual run made on new P-E Vapor Fractometer. To find mole % concentration of a component, analyst simply integrates area under peak by multiplying peak height (a) times half-band width (b).

*This quantitative analysis took only 23 minutes  
 on the new P-E Vapor Fractometer that costs only \$1,375*

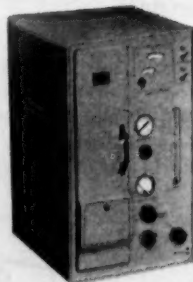
## HOW LONG WOULD IT TAKE YOU?

Employing the principles of gas chromatography, P-E's new vapor fractometer is a revolutionary advance in the field of gas and volatile-liquid quantitative analysis. It is fast, precise, uncomplicated to operate, extremely simple in calculation, and above all, many times less expensive than distillation columns, mass spectrometer, or any other instrument for the purpose.

For qualitative analysis, the instrument gives extremely clean separations—even of components and isomers which cannot be separated by ordinary methods. For trace analysis, high sensitivity permits use of extremely small samples.

Take, for example, the analysis of a synthetic LPG mix shown above. Here 12 components, representing the hydrocarbons most frequently encountered, were clearly separated—a job extremely difficult to accomplish by ordinary vacuum distillation methods. The perfect shape of the recorder bands makes quantitative analysis simple and accurate. Area under each peak is the measure of the mole % concentration of the component. These area relationships are all that is needed for calculation, without preliminary calibration for each individual component.

There is no faster, no simpler, no more inexpensive method in existence today.



This is the Model 154 Vapor Fractometer—price, \$1375.00 without recorder. Send for descriptive bulletin.

**Perkin-Elmer** CORPORATION

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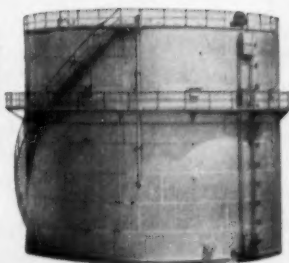


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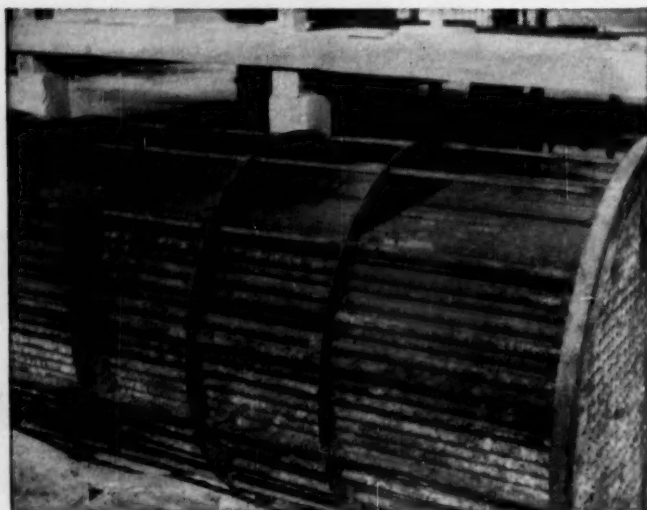
More and more refineries have found that when they use Polyrad, the filming amine inhibitor, they can expect to find bundles free of corrosion, ready for immediate return to service. As a result turn-around time no longer need be headache time.

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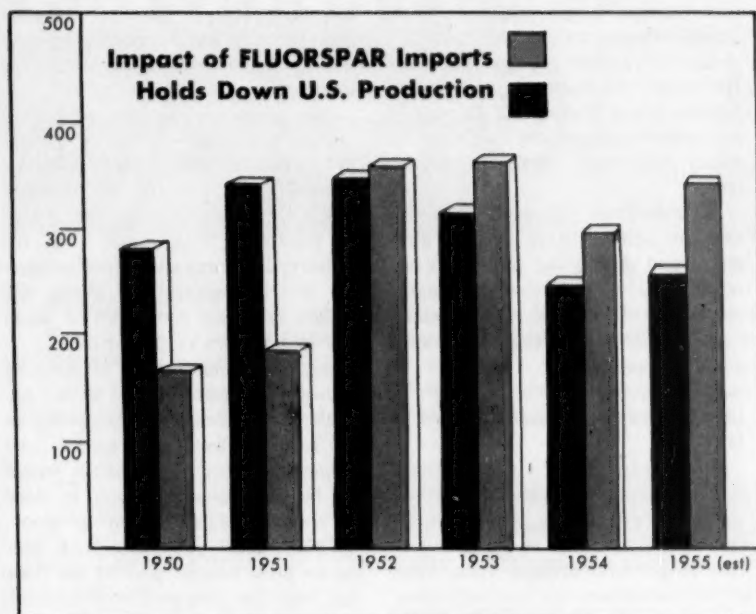
**or this?..** This is an all too common sight at turn-around time. Corroded and fouled bundles such as these call either for costly replacement, repair, or cleaning.

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HASS-5



## Fluorspar on the Rocks

U.S. production of fluorspar may touch 254,000 short tons this year—a slight increase over '54's 249,000—but imports, too, are slated to rise, and by a towering 46,000 tons over last year's more than 293,000.

Such imports, though admittedly necessary to fill this country's fluorspar needs, aren't making U.S. producers happy. Their complaint: present tariffs are too favorable to importers.

U.S. fluorspar production is now recovering from last year's slump. But this year's increased consumption will probably not lift the gloom that hangs over the nation's fluorspar industry. Reason: imports of fluorspar, which have consistently paced U.S. output since 1952, are still generating resentment among producers who insist that present tariffs favor the importer too much, greatly handicap domestic mining.

The figures for '55 won't be in for some time, of course, but indications are that the market is on the road to recovery. Production during the first six months of '55 was 127,100 tons; imports reached 169,600 tons in the same period. If the second half of the year is equally active, and informed observers predict that it will be, this could mean a slight turn for the better, with U.S. mines turning out some

5,000 tons more than last year.

The troubles for U.S. producers began in 1952 with a sudden surge of fluorspar coming in from foreign countries. In that year, such imports totaled 352,600 tons, while U.S. production amounted to 345,400 tons. Note this comparison in the preceding year, '51: production from domestic mines, 341,300 tons (only 4,100 less than in '52); importations, a low 181,300 tons.

By the following year, '53, imports were coming in at a near-record 360,800-tons/year rate, and U.S. fluorspar production had slipped to 322,800 tons.

Decreasing consumption in the U.S. during '54 delivered a simultaneous wallop to both foreign- and domestically produced fluorspar. Imports then totaled 293,300 short tons; domestic 249,000 tons.

Today producers of the latter are adamant in their stand that tariff rates\* are far too low, that the advantage enjoyed by imported spar will lead to further curtailment from U.S. mines. The complaint is supported in part by numerous mine closings and operational slowdowns that occurred in '54. Imported fluorspar is tabbed as the primary cause of these disruptions.

**Strategic Spar:** The largest outlet, historically, has been the use of the metallurgical grade as a flux in the manufacture of open-hearth and electric-furnace steels. Open-hearth steel demands for fluorspar have climbed from 213,000 short tons in 1950 to 252,400 tons in '53; electric-furnace steel has caused an increase from 27,600 tons to 35,000 during the same period.

Last year, however, the slump in steel output dropped consumption in these uses to 174,200 and 21,500 tons, respectively. This year—a boom year for steel—the market for metallurgical-grade fluorspar is recovering from the setback.

The second largest use of fluorspar has been in the manufacture of hydrofluoric acid from the acid-grade material. Consumption for HF manufacture has climbed from 124,400 tons in 1950 to 225,000 in '54, when, for the first time, it topped the amount used for steel.

Furthermore, this chemical use of fluorspar may well take the lead, permanently—even when steel production again reaches normal proportions. HF is a raw material essential to the manufacture of synthetic cryolite and aluminum fluoride. The consumption of acid-grade fluorspar is, therefore, intimately tied to the expanding aluminum industry.

For example, the production of one ton of aluminum requires about 85 lbs. of acid-grade fluorspar (converted into aluminum fluoride). If the cryolite used is entirely synthetic, an additional 55 lbs. of fluorspar is required.

In addition to the huge needs of the aluminum industry, fluorspar-derived hydrofluoric acid is needed in the manufacture of many chemical products; e.g., insecticides, wood pre-

\* Fluorspar is subject to duty of \$1.875/short ton of material containing over 97% calcium fluoride, and \$7.50/ton for lower-grade material. Spar imported for government stockpiling, of course, is duty-free.



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## MARKETS . . . . .

servatives, tooth-decay preventives, welding fluxes, synthetic optical crystals, antiseptics, dye mordants, high-octane aviation fuel, etc.

Another rapidly growing outlet for HF, hence fluorspar, is in the manufacture of the Freons and Genetrons, well-known refrigerants, and, more recently, important insecticide propellants.

Ceramic-grade fluorspar has the smallest annual usage of the three types, and during the past years has represented a progressively smaller percentage of total fluorspar consumption. In 1951, for example, ceramic grade accounted for 14.8% of all spar consumed in this country; by 1954 the percentage had dropped to 11.5.

The ceramic grade is used to make opal and opaque glasses, ceramic tiles, and enamels for coating metalware. It is also used as a flux in the manufacture of portland cement, rock wool, artificial abrasives, and basic refractory cements and bricks, and, finally, in the production of calcium carbide and cyanamide.

**Rock Reserves:** Domestic producers state that the nation's reserves of fluorspar are now the largest in history, and would be expanded further if prospects of profitable operation were better.\*

Industry sources estimate the total known domestic reserves at 20.9 million tons of ore containing more than 35% calcium fluoride. Government studies on reserves are classified, are not revealed publicly. (The same industry observers also place the national

\* Last year the government received seven applications for federal assistance in fluorspar exploration. Three contracts were signed, and two certificates of discovery resulted.

production capacity at 264,000 tons of acid fluorspar, and 298,500 tons of metallurgical spar; however, whether the estimates assume normal rates of operation or maximum obtainable rates is not clear.)

Not to be overlooked, of course, are the enormous reserves of fluorine in phosphate rock, which contains from 2.5 to 3.5% of the element. There are at least 13 billion long tons of phosphate rock supplies in the country; and some authorities estimate the fluorine content at about 420 million tons—an equivalent of about 900 million tons of fluorspar.

But phosphate rock as a source of fluorine is necessarily tied to the nation's requirements of phosphates in the form of fertilizers, animal feed supplements, and chemicals. It would not be economically feasible to mine the rock for its fluorine content alone.

Today, most phosphate rock producers must remove part of the fluorine from the processed rock whether they want to or not. In the manufacture of superphosphate, for example, acidulation of the rock produces fumes of silicon tetrafluoride, which must be removed by lime treatment in order to control air and stream pollution. Some producers now recover the fluorine compounds in usable form, sell them for purposes such as water fluoridation.

There are well over 200 phosphate rock acidulators in the U.S. today, but only a little over half of these recover fluosilicic acid. Too, many small firms are among these producers since geographic location with respect to markets often determines whether or not recovery of the acid is worth while. But the basic assumption is that

### U.S. Fluorspar End Use by Market Grades

(% total consumption)

	1951	1953	1954
Metallurgical	52.7	47.6	39.9
Acid	32.5	40.4	48.6
Ceramic	14.8	12.0	11.5

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- B Dispersion and Wetting of Solids**
- C Wetting and Dispersion of Liquid-Solid Systems**
- D Inhibition of Rust and Corrosion**

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<b>DISPERSION AND WETTING OF SOLIDS</b>		
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10. Emulsifiable Solvent Cleaners	Dispersing Agent for Oil and Grease Deposits	Acts as Emulsifying Agent
11. Dry Cleaning Compounds	Linking agent for Water and Solvent	Loosens Dirt Absorbed by Fabric
12. Fat Splitting Process	Dispersing Agent for Solid Fats	Acts as Wetting Agent
<b>INHIBITION OF RUST AND CORROSION</b>		
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## MARKETS . . . . .

if a plant can collect 150 tons/year of acid (on a 100% basis), recovery might be economical.

A few other phosphate rock processors go further and remove the silica to produce sodium fluoride for general industrial use. But such a process is relatively costly, and seems attractive to only a limited number of firms.

Although phosphate rock must be considered, over the long range, a possible reserve of fluorine, many technical and economic problems are yet to be solved before it can be considered a dependable source. The difficulties encountered in obtaining from superphosphate by-products a fluorine product sufficiently low in silica content are considered major obstacles. Extraction methods now used still keep the unit cost of these products substantially above those of chemicals obtained from fluorspar at prevailing market prices.

Since phosphate rock is not now a dependable source of fluorine, the government must rely on regular U.S. and foreign reserves of spar.

This means that domestic reserves must be expanded, and production must be kept economically attractive enough to keep present producers in the business.

But it also means that foreign sources must be kept alive to help maintain supplies for the nation's stockpile needs and the growing demands of the steel and chemical industries. Domestic fluorspar production, the government seems to feel, cannot be relied upon to meet these demands while the price structure is kept attractive from the consumer's point of view.

(Last year the government sought to alleviate the U.S. producers' plight, added fluorspar to the nation's stockpile list, raised the depletion allowance from 15 to 23%. But aid has also gone to foreign producers as exemplified by the Export-Import Bank's \$400,000 loan for the construction of a fluorspar mill in Spain.)

In the next few years, both foreign and domestic producers will be selling more fluorspar to the nation's industries since consumption is bound to increase. But U.S. marketers are having a hard time capturing that larger slice of business and the profit increases—which, they aver, is necessary to put this country's fluorspar industry on a firmer footing.

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### physical properties

Boiling point, °C @ 760 mm.....	190.5
Dilution ratio with Toluene.....	1.8
Evaporation rate (n-butyl acetate = 1.0).....	0.02
Flash point, Cleveland Open Cup, °F.....	205
Pounds/gallon, 68°F.....	9.2
Refractive index, $D_{20}^{25}$ .....	1.4150
Solubility in water, % weight @ 20°C.....	16.4
Solubility water in, % weight @ 20°C.....	7.0
Specific gravity, 20°/20°C.....	1.1063
Vapor pressure @ 20°C mm Hg.....	0.25
Viscosity, centipoises @ 20°C.....	2.86
Viscosity, 10% 1/2 second nitrocellulose solution, centipoises @ 25°C.....	444

### specifications

Specific gravity, 20°/20°C.....	1.103-1.109
Distillation range, °C.....	186-195
Ester content, % minimum.....	97
Acidity, as Acetic, % weight, maximum.....	0.15
Color, APHA.....	15

\*Reg. U. S. Pat. Off.

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# Market Newsletter

CHEMICAL WEEK  
NOVEMBER 19, 1955

Those titanium dioxide consumers who have been hamstrung for months because of the generally acute shortage won't have too much longer to wait for surcease.

One major maker will be in with additional producing facilities within the next several weeks, and at least two other expanded facilities will be turning out dioxide in the early months of '56.

Thus far this year, heavy domestic consumption and exports of the pigment have had producers here straining to meet the demand. By the middle of next year, however, productive capacity should top, by a near-100,000 tons, the current estimated 350,000 tons/year.

The diminishing market tightness may have some effect on titanium dioxide prices, but right now the probability of any immediate revisions appears rather slim.

That can't be said for shellac, though; prices are anything but stable. For example, bleached grades (which go chiefly to floor wax outlets) are up some 3¢/lb.—a move that was anticipated by most major importers when orange grades of shellac were boosted two weeks ago. And the latter, too, have again been advanced slightly.

Reasons for the price fluttering here are due to a supply shortage at the source, plus the fact that European consumers are buying heavily.

Reports are that there may be an easing in the price uptrending as more material becomes available at primary markets, but as of now some dealers are expecting prices to go higher before they begin slipping.

The styrene monomer market continues to boil right along in hand with today's high-stepping synthetic rubber production (which takes nearly 50% of the styrene sold). Underscoring styrene makers' high spirits: Koppers late last week noted a milestone—it had produced the billionth pound of monomer at its Kobuta, Pa., plant.

The firm, incidentally, is now turning out more than double the output of the original wartime facilities, which were capacity-rated at 75 million lbs./year when Koppers bought the government-owned styrene plant back in '46.

Too much, too much. That's the reason behind Lithium Corp's decision to shelve operations early next year at its South Dakota spodumene (lithium ore) mine. The earlier shortage of spodumene, says the company, has been overcome by development of new sources; and inventories of the lithium raw material are now high enough to cover requirements for many months.

How adequate these inventories are can be surmised from this company promise: production of all its 25 lithium chemical compounds will be further increased.

The caustic soda market gives no indication of swinging soon from its current snug condition. That goes for both liquid and dry forms of the material. Flake caustic, in particular, is reportedly leaning well toward the tight side—a prolonged effect of the industry's summer strikes plus some brisk buying for manufacture of detergent mixes, textile dyeing and finishing, and other specialty outlets.

Export prices on the solid material haven't yet been pressured upward (they're still at \$2.95 to \$3.05/cwt., f.a.s.), but some dealers are having difficulty

## Market Newsletter

(Continued)

getting spot deliveries because of the squeezed domestic supply position.

On the price front, buyers of petroleum sulfonates (mahogany soaps) and petrolatum will feel the pinch of oil refiners' higher raw material costs. Increases, the first in years, amount to  $\frac{1}{2}$ ¢/lb. on all grades of the sulfonates, and  $\frac{3}{4}$ ¢ on petrolatum.

New tank-car prices on the former, posted by some refiners, range from  $13\frac{1}{2}$ ¢/lb. for 420-435-molecular-weight material to  $15\frac{1}{4}$ ¢ for 450-470.

You can look for an upcoming  $\frac{1}{4}$ ¢ to 2¢/lb. advance in the differential between tank-car and c.l. tags, too. Reason: cost of drums is higher.

Resellers' prices are usually an accurate gauge of a chemical's availability, and it explains the firm—and high—resale tags on some important nickel derivatives. "Scarce" scarcely describes today's supply situation on nickel sulfate and chloride, for example, and what little does occasionally appear on the spot market is commanding as much as 15¢/lb. above makers' schedules.

Producers will likely continue to reserve bulk of their salts production for regular customers (as long as the metal is short), leave little for "sometime" buyers.

Don't be surprised, either, if "official" schedules on some nickel salts move a little closer to resale price levels.

To the list of items that will cost more come Jan. 1, add these two: sulfur monochloride and sulfur chloride yellow. At least that's the effective date for the  $\frac{1}{4}$ ¢/lb. increases (to contract customers) just posted by major producer Stauffer.

Spot buyers, though, will start paying the new prices immediately. They're the same for both chemicals: tank cars,  $3\frac{3}{4}$ ¢/lb.; c. l. and l.c.l., 4¢ and  $4\frac{3}{4}$ ¢/lb., respectively. Quotations are f.o.b. plant, freight equalized at competitive points.

Speaking of prices, ammonium sulfate consumers have less than two weeks left to take advantage of the \$1/ton discount that producers set up last June as part of their "bargain rates" policy. As of Dec. 1, quotes go back up to the base \$42-47.50/ton (depending on point of origin).

### SELECTED CHEMICAL MARKET PRICE CHANGES Week Ending November 14, 1955

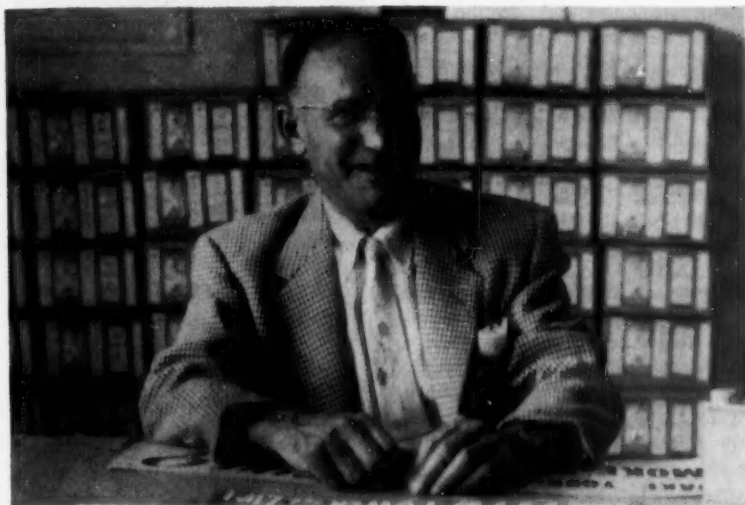
#### UP

	Change	New Price
Carnauba wax, No. 3, Casra, crude, bgs., ton lots	\$ 0.02	\$ 0.57
Petrolatum, amber, dms., c.l., refd.	0.0037	0.0562
Petroleum sulfonate, oil sol., 60-62 pcs sulfonic, dms., c.l., wks.	0.005	0.165
Shellac, bleached, bone dry, bgs., 1,500-lb. lots	0.03	0.61

#### DOWN

Blood, dried, high-grade, ungd., 16-17% ammonia, bgs., Chic., unit-ton	\$ 0.25	\$ 5.25
Copper oxychloride, dms., c.l., wks.	0.0475	0.50
Tankage, animal, feeding, 9-11% ammonia, bulk, unit-ton	0.25	4.75

All prices per pound unless quantity is stated.



KLEEN-FLO's GOLDSTEIN: 'For or against it, they still respond to the issue.'

## Smog: Cue for Fuel Additives

Any firm that can take a vital public issue—smog—and turn it to profit deserves a back-pat for smart merchandising. Kleen-Flo Co. (Los Angeles) has done that. But Kleen-Flo's President J. M. Goldstein feels that he's doing more—that he's making a worthwhile contribution toward its reduction.

Smog, as a matter of public concern, is nothing new. But very few specialties makers have found a way to make it boost sales. Goldstein, producer of

an auto fuel additive, started emphasizing the smog-reducing angle only last March, redesigning his label to plug the point. Since then, sales of the additive (which is admittedly still a small factor in this field) have climbed 25%.

**Everything Helps:** Independent organizations dealing with smog, such as Los Angeles' own Air Pollution Foundation, have shied away from suggesting virtually any fuel additive, attachment, or fuel change as a means of combating smog.\* It told *CW* that the degree of control that could be gained from improved fuel use in autos would be insignificant.

Kleen-Flo, admitting that its accomplishments might be small in the over-all picture, feels any contribution toward lowering output of engine smoke helps. It is cooperating with the Southern California Service Station Assn. (claiming 602 members) plan, where member stations give free carburetor tests and adjustments. Where additives such as Kleen-Flo can help clean sticky carburetors, the com-

pounds are used. Under way now is a program to determine the lasting effect of such treatment.

It is the association's belief that best possible results might mean a 4% reduction in exhaust pollution—small, but certainly worthwhile.

**New Pitch:** Though the antismog pitch is new, Kleen-Flo has been on the market for 20 years. It is sold largely in the southern California area (where, as Goldstein puts it, "the public is interested in smog control. Whether they are for it or against it, they still respond to the issue"), although some is distributed in the New York region, and some in Canada.

Sold through garages and service stations, it is also sold to fuel oil distributors, and to distributors of gas power lawnmowers. For the motorist, the product is sold in 8-oz. containers for \$1. Each can is said to be good for 30 gal. of fuel. It is said to free sticky valves, lifters, and piston rings—"remove carbon, varnish, gums and sludge—without causing smoke and fumes."

So far, few other specialties have been promoted with no-smog advertising. In some Eastern areas, Ox'O Fluid, made by Ox'O Gas Co. (Palisades Park, N.J.), has been sold with a similar theme. But Kleen-Flo, with an appealing song for smog-plagued Los Angelenos, seems to have made the most significant gains from the new pitch.

## Cleanup Spot

A couple of contrasts mark the week's news in the detergents. The clothes washer market for heavy-duty syndets, long dominated by spray-dried products, is now being tackled by Armour & Co. with a can-packed liquid, Gee. And in the dishwashing field, where liquids have enjoyed their greatest success, Procter & Gamble has launched a green powder product called Cascade (specifically for automatic dishwashers).

Of the two developments, the new Gee is most significant. The heavy-duty washing field—hand or machine—has never been seriously challenged by a liquid. From the time of sturdy bar soaps to present-day built synthetic detergents, solid forms have held sway. But Armour, which jarred

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**ATTENTION GETTERS:** Via newspapers, the antismog pitch.

\* The foundation believes that liquefied petroleum gas for automobiles, buses and trucks would be prohibitive in cost (and of uncertain effectiveness); that use of alcohol fuels, too, has questionable merit from an antismog standpoint, and because such fuels are more expensive than gasoline; that use of Houdry catalysts in mufflers is economically infeasible. It feels that most promise lies in use of afterburners, or some type of catalytic converters, in combination with several other factors.

the trade a few years ago with its smooth and effective promotion of hexachlorophene-containing Dial, is first with a souped-up liquid for washers of all types (with emphasis on automatics).

**Metal Jacket:** Now on test in Jackson, Miss.; Montgomery, Ala.; Springfield, Ill.; and Terre Haute, Ind., are two sizes of Gee—the regular 14-fluid-oz. unit, and a new 22-oz. can with a polyethylene no-drip nozzle. American Can Co., thought to be the supplier, won't confirm or deny it. The small can is tagged at roughly 37¢; the large, at 69¢.

Armour, which has filed for patents on its liquid, is loth to talk about it. Physically, however, it is a thick, milky liquid with a blue tint. It is pleasantly perfumed (little or no syndet odor). Although Armour won't confirm or deny, Gee appears to contain the dirt-suspending agent, carboxymethylcellulose (CMC). It is also a controlled-foam product.

Instructions call for about 3-4 oz. of the product per wash—at 37¢/14 oz., that adds up to just about a dime per wash. The price may prove to be no deterrent to its acceptance, however—there's no question but that most syndets have lost their newness, and the new liquid form might well catch the housewife's eye.

**Off with a Bang:** Cascade, the new P&G automatic dishwasher product, is perhaps most noteworthy for the speed with which it has been given national distribution. P&G, which took 18 months to spread Joy liquid all over the nation, stepped out boldly with Cascade. Officially on the national market last month, it was arriving on Eastern store shelves only last week.

Pine-scented, green in color, Cascade is packed in a fiber box with metal pouring spout. Significant formulation detail: like P&G's Dash for automatic washers, Cascade is a mixture of synthetic detergent and soap. It is claimed to leave no spots on automatically washed glassware, and to be completely safe for use with china, silver and aluminum. The 20-oz. box sells for 40-45¢.

Both new products make one aspect of soap and detergent merchandising plain: the often talked about, and technologically possible, product—the detergent that can handle nearly all phases of washing (clothes, dish, hand and bath) is a mighty long way off.

## It Takes Two

No one lining will do the trick. That's the feeling at Plax Corp. (Hartford, Conn.) toward the matter of lining polyethylene containers to reduce permeability. And last week Plax put its lined bottles on the market, along with several other new developments in polyethylene, acrylic, and polystyrene plastics.

Plax is now offering containers lined with at least two different materials, which it believes will solve many—but certainly not all—of the problems in packaging polyethylene-permeable materials. Applied by a newly developed mechanical device, the linings can be "welded" to the containers (in cases like squeeze bottles, where separation might create difficulties), or less securely attached in cases where it makes no great difference. Lubricating oils and many essential oils are satisfactorily contained.

Just how much packaging in the new units is going to cost, Plax believes must be determined on an individual basis. It is a rough estimate that the coated units cost about 2¢ more each than uncoated.

**Forty and Eight:** Paul Fortner, Plax vice-president in charge of research, outlined the study that has gone into the development of the linings—study that was begun just about as soon as the shortcomings of polyethylene were recognized. Starting with some 40 compounds, Plax narrowed the search down to eight, then settled on two which showed the best combination of versatility, ease of application, low cost, etc. Exactly what these are, the firm won't say.

Though it is not now sold as a lining material, Plax holds high regard for the so-called low-pressure polyethylenes\*, which it prefers to term "polymethylenes." Because these compounds have much better permeability characteristics, and because they can be blended with polyethylene or coated on it, it seems likely that Plax will eventually be selling polyethylene, lined with polymethylene.

(Bottles of plain polymethylene, too, will doubtless be offered, for certain uses. The polymethylene bottles, noticeably different from those of polyethylene, have shown excellent heat stability. Irradiated polyethylene, at

\* This would include the Ziegler and Phillips products, which vary greatly from older types of polyethylenes.



PLAX'S FORTNER: He started with forty.

first thought to permit the squeeze bottle to be autoclaved, has not lived up to expectations.)

New linings weren't the only products Plax showed that will interest specialties makers. Besides new designs in bottles and jugs, the firm has been working hard on a polyethylene aerosol container. So far, it is still in the experimental stages, but the promising field for a flexible, unbreakable, pressure container indicates that it will be available soon.

## Nothing to Sneeze At

While much of science's attention is riveted on the tests of a new anti-cold virus (*CW Technology Newsletter*, Nov. 12), medicine makers are more concerned with new additives for over-the-counter cold remedies.

Currently being pushed by Grove Laboratories (St. Louis) and its affiliate, Clayton Laboratories (Chicago), the new additives are "citrus bioflavonoids." Grove now puts them into its old standby, Bromo Quinine Cold Tablets; Clayton created a special tablet, tagged Citroid, around its bioflavonoid (*see cut*). Both products are now being put into national distribution.

Besides Grove, half a dozen other firms will soon be selling flavonoid-fortified cold tablets. J. B. Roerig, for one, is selling such an over-the-counter product now (*p. 129*).

As far as medical science goes, the

# Nobel Prize Winner's Research Leads to Discovery of Medicine's Newest Weapon for CONTROL of COLDS

Science Harnesses Natural "Anti-Virus" Factor Discovered by Doctor in Citrus Bioflavonoids—Absolutely Safe Defense Against Cold Virus!



**CITROID**  
CONSUMABLE

## CITROID STORY: It started with Szent-Gyorgyi.

bioflavonoids are not spanking new. They've been sold (and are now) in a number of prescription cold remedies—U.S. Vitamin's CVP is an example. The inner portion of the peel of citrus—oranges, lemons, grapefruit—is the source of the flavonoids, and there is a considerable variety of both water-soluble and insoluble types.

Hesperidin, from oranges, an insoluble type, is used in Bromo-Quinine; a mix of it plus water-soluble types goes into Citroid. Hesperidin is sold only by Sunkist Growers (Los Angeles) now (it is a patented product). Pasco Packing Co. (Dade City, Fla.) supplies the water-soluble types (such as go into CVP).

**Sales Spurt:** Though the bioflavonoids have been available for 10-15 years, it is only recently that they've been quantity materials. Sunkist began industry's biggest promotion of them two and a half years ago, with the formation of its pharmaceutical department.

The bioflavonoids are expensive—hesperidin is about \$10/lb. Others run as high as \$23.50/lb. This is reflected in the price of the tablets: Bromo-Quinine, for example, is up 4¢/small package, 10¢/large. Anahist (New York) and Vick Chemical, likely to incorporate the bioflavonoids soon, haven't indicated definite price changes.

Expensive or not, the citrus deriva-

tives are booming. Word is that sales in '55 are 10-fold those in '54, and hopes are that over \$3 million worth will be moved in 1956.

**Capillary Action:** As explained in Citroid promotion literature, the key to bioflavonoid action seems to lie in the capillaries. It appears that healthy capillaries, though permeable to nutrient fluids, are resistant to the passage of virus. Only when weakened (by chills, nervous stress, the ads say) will virus seep through to cause the problems associated with colds. Citrus bioflavonoids appear to strengthen capillary walls, make them less likely to pass virus. Dr. Albert Szent-Gyorgyi is credited with laying the groundwork for this approach to cold therapy in work he did in the '30s.

It is emphasized that the bioflavonoids do not work alone. In all formulations, the bioflavonoids are combined with considerable amounts of ascorbic acid (vitamin C). Although the new compounds are suggested for "first sign of a cold" use, they appear to have some value in more advanced cases of colds.

Grove and Clayton emphasize that the bioflavonoids are "safe." They cause no skin rash, drowsiness, upset stomach. As such, they will doubtless make a formidable new addition to the cold-fighting arsenal. And should they mirror even dimly the success of the antihistamines, they could become important factors in the \$200-million cold remedy market.

**Not Milk-Barred:** Diazinon, Geigy's phosphate fly killer, has been approved for use in dairy barns. Residual applications don't contaminate milk, and are said to be effective against flies that have developed resistance to chlorinated insecticides.

**Disposable Walls:** BoothGuard, a new strippable protective coating, is designed for use on the walls of spray booths and other areas prone to catch paint, grease or other hard-to-remove dirt. The water-type, nonflammable coating covers in one coat, will neither feather nor web when sprayed on, nor tear nor shred when stripped, the company says. It is made by Guard Coatings Corp. (Long Island City, N.Y.).

**Cold War:** A combination of agents for relief from symptoms of the

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## SPECIALTIES

common cold is packaged by J. B. Roerig & Co. (Brooklyn, N.Y.). The package contains the multivitamin and mineral preparation Viterra, and the cold relief preparation, Coryban. Coryban contains salicylamide, acetophenetidin, caffeine, propenpyrid-

amine maleate, ascorbic acid and purified hesperidin, is designed to reduce fever, relieve headache, fight drowsiness, give relief from running noses.

**Better Coats:** For improving the processing properties of coating for-

mulations for paper, Witco Chemical Co. (Chicago) has developed an aqueous dispersion of calcium stearate, called Witco Paste #253. The compound is claimed to improve lubrication, roll release, and the flow of coatings.

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### Typical Analysis:

Assay ((NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub> )	99.5	%
Insoluble	0.005	%
Residue after Ignition	0.01	%
Chloride (Cl)	0.001	%
Phosphate (PO <sub>4</sub> )	0.001	%
Arsenic (As)	less than 0.00005	%
Heavy Metals (as Pb)	0.0002	%
Iron (Fe)	0.001	%



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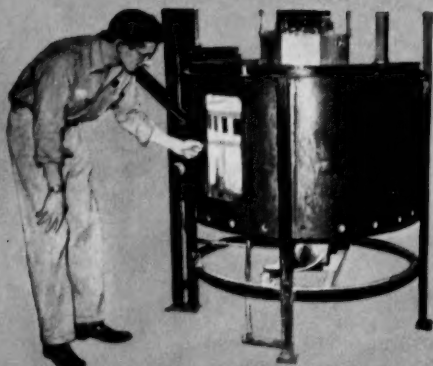
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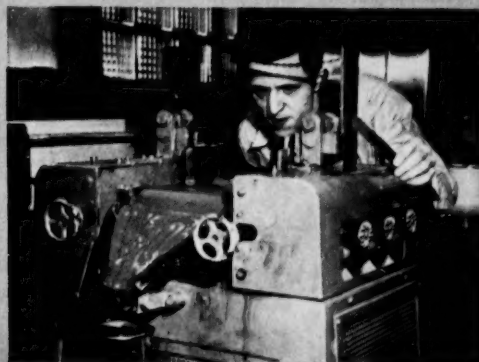
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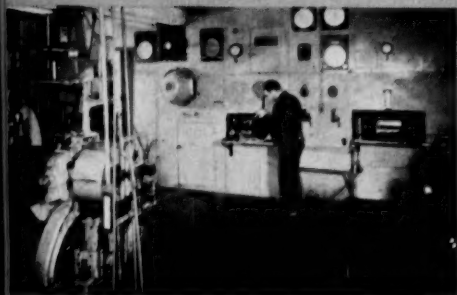
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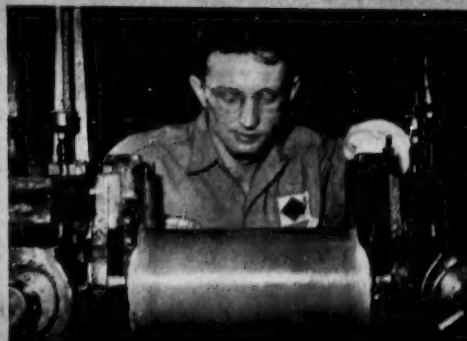
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